SUCCESS THROUGH HEALTH

15 WEST 16th STREET
NEW YORK, N. Y., 10011

P. 271—281
C.2

THE HEALTHY LIFE SERIES

Including a Program of Safety Education

SUCCESS THROUGH HEALTH

BY

JOHN GUY FOWLKES, PH.D.
PROFESSOR OF EDUCATION, UNIVERSITY OF WISCONSIN

LORA Z. JACKSON
ASSOCIATE LIBRARIAN, JACKSON CLINIC
MADISON, WISCONSIN

ARNOLD S. JACKSON, M.D., F.A.C.S.
JACKSON CLINIC, MADISON, WISCONSIN

THE JOHN C. WINSTON COMPANY
CHICAGO PHILADELPHIA TORONTO
ATLANTA LOS ANGELES DALLAS

HV1624
K382
F829
Copy two

Copyright, 1940, by
THE JOHN C. WINSTON COMPANY
Copyright, 1938, the J. C. W. Co.

Copyright in Great Britain and the
British Dominions and Possessions
Copyright in the Philippine Islands

All rights reserved

H. L. S.

PRINTED IN THE U.S.A.

F-3-46

Introduction

It has long been apparent to me that if any great hope is to be entertained of educating the American people concerning personal health and hygiene, they should be given an elementary but fundamental knowledge of the physiology of the human body, with understanding of just how and why its various parts may become disarranged. When the members of a generation have received the proper instruction during childhood—instruction which will awaken a sound, wholesome, and enduring interest in health—by high-school age they will be better able than the average parent now is to evaluate information about health and disease, and to separate wheat from the chaff of unwarrantable claims.

I am glad to know, therefore, that many concerned with education in the public schools recently have come to recognize education about health as one of their most important functions. It is a pleasure to recommend this series of books to educators, to parents, and to children themselves as a vehicle whereby facts about health may be imparted and acquired in such a way that knowledge will be gained and action unquestionably will result.

CHARLES H. MAYO, M.D.,
The Mayo Clinic,
Rochester, Minnesota.

Foreword to the Teacher

It is generally agreed that one of the major functions of public schools lies in the field of health education. A sound program of health education should help boys and girls to establish and practice desirable health habits based upon recent scientific information.

A program of health education such as that just pictured requires text material which will stimulate the interest of a child in his health, make him conscious of problems of public health, motivate the learning of important and valid facts, and guide the child in the utilization of such facts to maintain his own health and the health of his neighbor. The Healthy Life Series aims to present text material in health which meets the requirements just given.

Care has been taken to introduce basic ideas through situations which the child meets in his daily life. A vocabulary has been used which eliminates needless reading difficulty. At the same time scientific terms have been introduced, along with clear definitions, where they are the most natural forms of expression and can be easily learned. Many illustrations which clarify, expand, and supplement the content of the text are presented. Recommendations of superior health curricula concerning information which should be presented and the order of presentation have been observed.

Units and sections marked with large black stars are optional units. The asterisks denote words defined in the glossary.

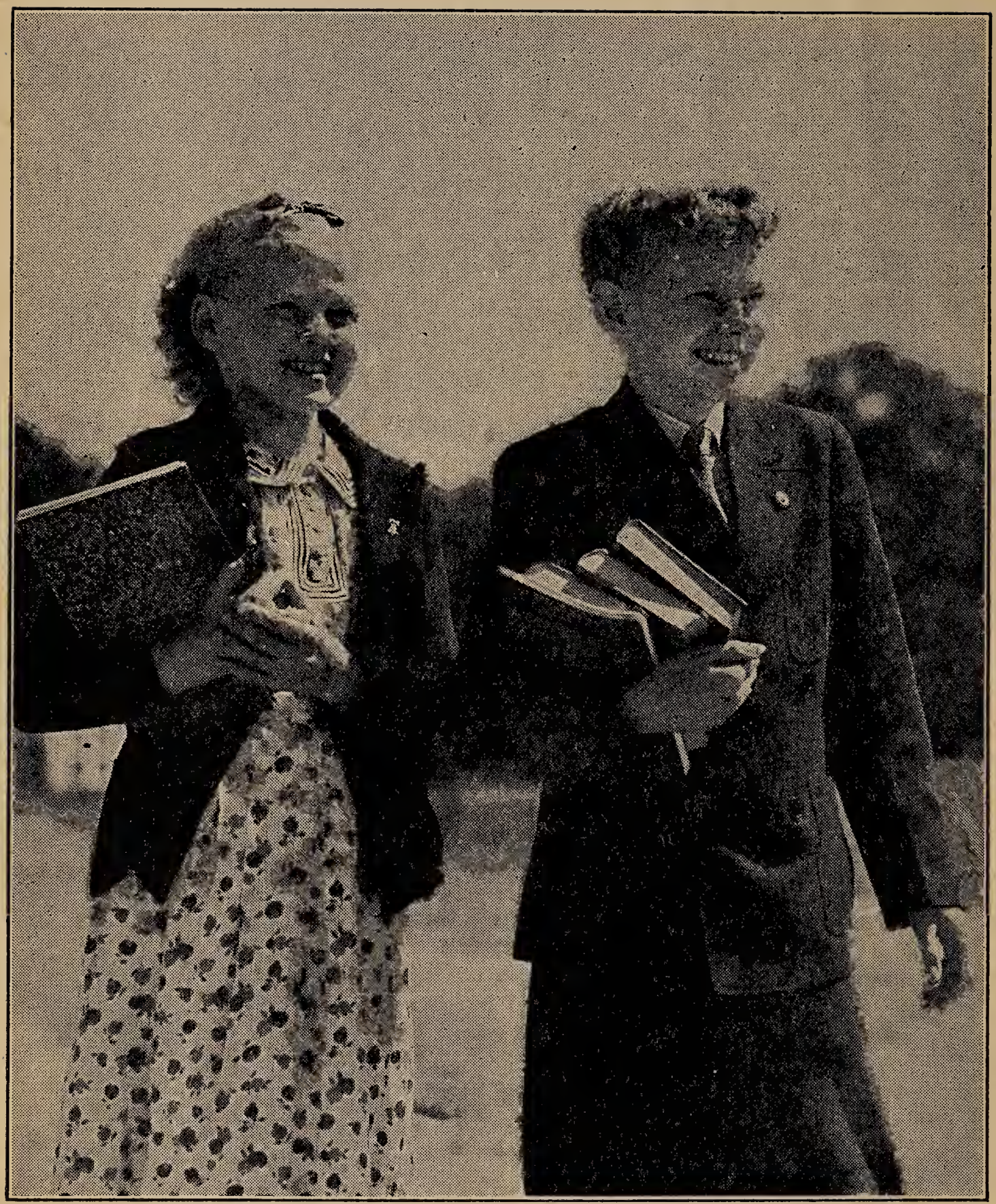
In addition to the host of people whose names cannot be mentioned, grateful acknowledgment is made to Miss

Elda Merton, Elementary Supervisor of Schools, Waukesha, Wisconsin; Mrs. Ethel Mabie Falk, formerly Director of Curriculum, Madison, Wisconsin; Mrs. Janet Millar, Director of Curriculum, Madison, Wisconsin; Misses Delia E. Kibbe and Maybelle G. Bush, Supervisors of Elementary Schools, Wisconsin Department of Public Instruction; Dr. H. E. Marsh, Madison, Wisconsin, and Dr. R. H. Jackson, Madison, Wisconsin, for their generous criticisms, made after many readings of the manuscript. Permission of the following companies to quote from their publications is appreciated: The National Geographic Society, *The National Geographic Magazine*, Vol. LXVIII; D. Appleton Company, *Notes on Nursing: What It Is, and What It Is Not*, by Florence Nightingale; The Macmillan Company, *Twenty Years at Hull House*, by Jane Addams, and *The Second Twenty Years at Hull House*, by Jane Addams; The National Safety Council, *Safety Education*, Vol. XV; Doubleday, Page & Company, *William Crawford Gorgas—His Life and Works*, by Marie D. Gorgas and Burton J. Hendrick; C. V. Mosby Company, *Life and Letters of Dr. William Beaumont*, by Jesse S. Myer; The Metropolitan Life Insurance Company. In the preparation of the manuscript for publication, the assistance of Edward J. Braun, Vergil Lyon, Russell Moberly, Clifford Hawley and Abner L. Hansen is gratefully acknowledged. Without the generous and extended encouragement and help of Dr. W. D. Lewis, Editor of the John C. Winston Company, the manuscript could not have been completed.

THE AUTHORS

Contents

			Page
Chapter	I.	Preparing for an Expedition	1
Chapter	II.	Living in a Land of Ice	15
Chapter	III.	A Successful Adventure	26
Chapter	IV.	Foods and Diet	44
Chapter	V.	Taking Care	61
Chapter	VI.	First Aid	90
Chapter	VII.	The Lady with the Lamp	106
Chapter	VIII.	Making a Community Healthy	140
Chapter	IX.	Preventing Disease	178
Chapter	X.	How You Can Prevent Disease	215
Chapter	XI.	The White Plague	239
Chapter	XII.	Learning through the Senses	271
Chapter	XIII.	Knowing Yourself	302
Height-weight Tables			335
Glossary			339
Index			347



By Harold M. Lambert, Phila.

Health, vigor, and happiness

By Keystone View Co., N. Y.

CHAPTER I

Preparing for an Expedition

A Land of Whiteness

The world was a sheet of whiteness. Off to the horizon in three directions there was not a house nor a tree nor a blade of grass, only one vast extent of ice and snow. In the fourth direction the whiteness was broken by the open water of the Antarctic Ocean. Even the open water bore its burden of ice. Icebergs floated thickly on the surface.

Threading its way carefully between the great bergs toward the more solid ice came a ship. Admiral Richard E. Byrd, already famous for being the first

man to fly over both the North and the South poles, was coming with his men to winter for a second time so near the South Pole that he must endure a temperature as low as −70° F. During the warmest summer month it averages only 23.6° F. above zero.

Byrd had already made a remarkable record of three expeditions into polar regions without losing a man. His fourth expedition was to be larger and more hazardous* than the others. Could he maintain his remarkable record? This bleak country had already claimed the lives of Scott and his party, Macintosh, and other brave explorers. Shackleton's ship had been crushed in ice as if it had been a peanut shell.

Getting Ready

Much of Byrd's success so far had been due to his keen foresightedness. "South of Fifty (that is, land south of fifty degrees south latitude—you can find it on your map) is no place for second guessing. Either you're ready or sorry," Byrd had declared. Two years before he left the United States he began to get ready for this expedition. He knew that thought, strategy,* and planning would save much grief later. He also knew that the world near the South Pole was a very different place from the temperate, civilized country to which his men were accustomed. They must have warm clothing and shelter to protect them from the severe cold, more intense than anywhere else in the world. "We were devising means to overcome our problems

By Underwood & Underwood, N. Y.

Shackleton's ship was crushed by the ice

thousands of miles before we came to them. Often we were wrong, but we always knew what we were up against and were prepared for the worst," said Byrd.

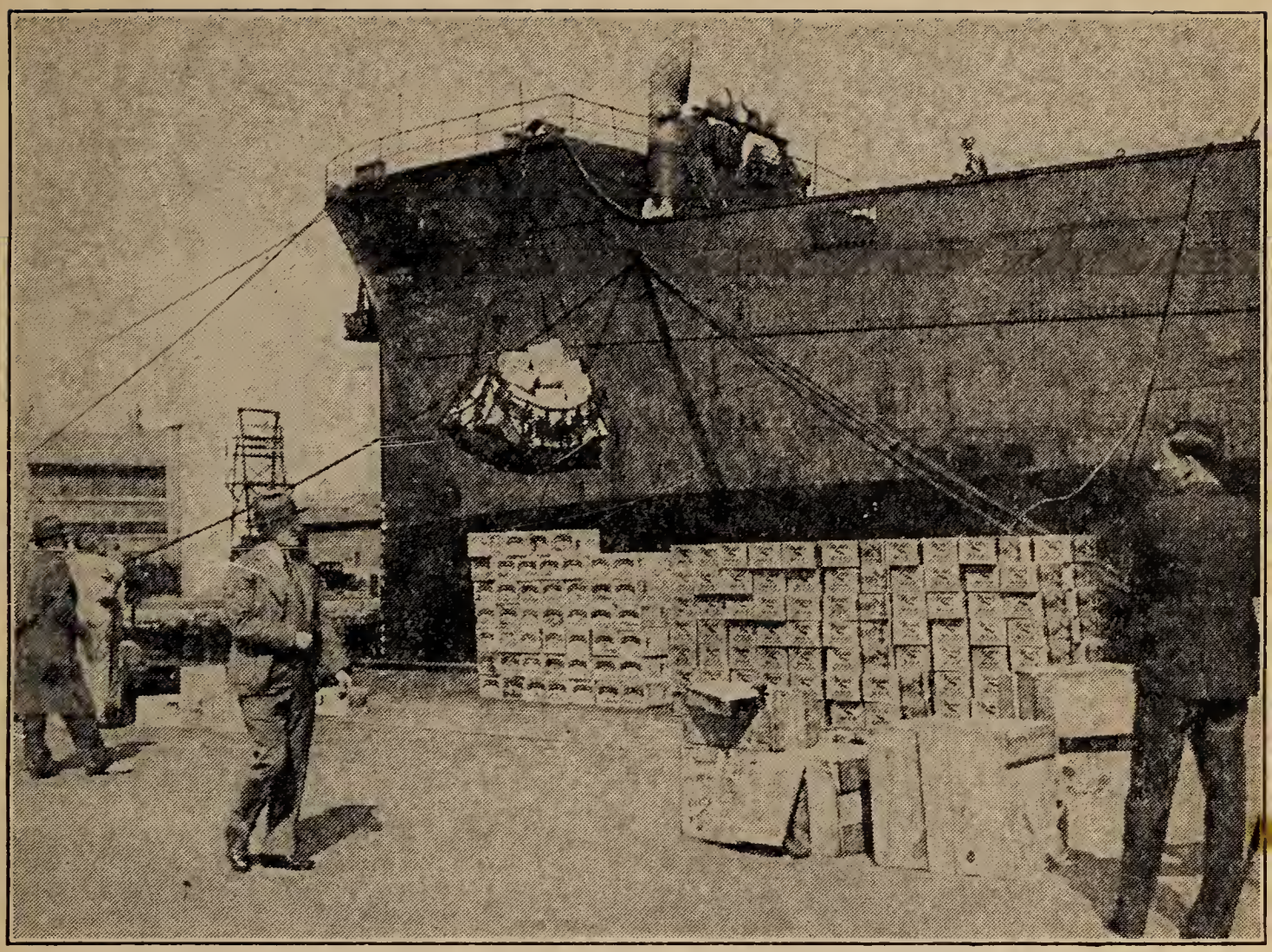
He knew that the only fresh food to be found in this bleak country was penguin* and seal meat. All other food required by men and dogs doing hard physical work must be taken with them. This food must be so balanced that there would be no sickness from lack of any food essential.* A disease called *scurvy** had been the curse of former polar expeditions because they did not understand the need of a well-balanced diet.*

Byrd took many precautions* against other dangers. Snow glasses worn to prevent snow blindness were perhaps the simplest of these. It has been said of Byrd that his impulsive* response to the call of some new adventure has never involved unnecessary danger to the lives, the limbs, or the health of his men.

Further Preparations

Months before Byrd started on his trip the supplies had been gathered in Boston. Fur clothing from Alaska, special ice axes from Switzerland, skis from Norway, and stoves from Sweden had been gathered. Along with tons of sugar and flour were packed two thousand pounds of dehydrated* vegetables. Blankets, shirts, wool socks and wool mittens, overalls, brooms, snow shovels, one hundred twenty-five cases of soap, and more than fourteen thousand other items were included. There were tractors, airplanes, dogs, and sledges, together with all their necessary supplies. There were books and movies for recreation. No possible item which was necessary to the health and safety of the men was overlooked. Great care was exercised in selecting all materials, for men's lives depended on them.

Still greater care was exercised in selecting men to go on the expedition. Every man had to be in excellent physical* condition. Paul Siple, who as a Boy Scout had accompanied Byrd on his previous expedition, was ready to go with him again. Now, as in 1927, he was able to present a good report of a



By Keystone View Co., N. Y.

Loading the *Jacob Ruppert* at Boston

complete physical examination by a competent* physician. This included an examination of the heart, lungs, eyes, ears, kidneys, teeth, digestive tract, nose, throat, nerves, blood, physical development, posture,* and condition of the feet. It also included certificates showing that Siple had been immunized against diphtheria, smallpox, and typhoid fever.

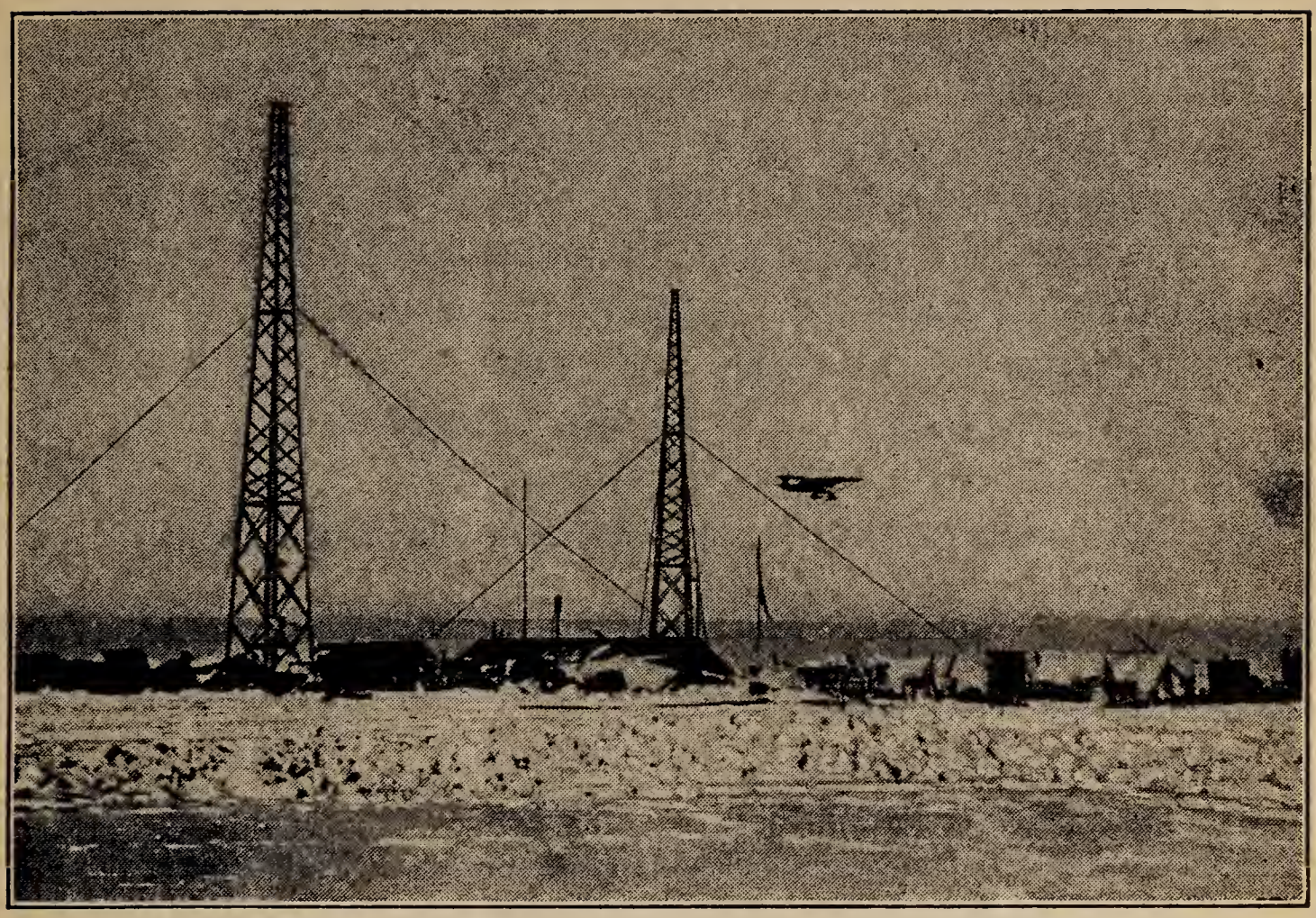
Such complete examinations by a competent physician were necessary for each man. A person with active tuberculosis would spread the disease to other members of the party. A person with a weak

heart would not be able to endure strenuous exercise or intense cold. A person with diseased tonsils or abscessed teeth might contract rheumatism, heart trouble, or other dangerous illnesses, and therefore, such foci* of infection* had to be removed before the expedition started. Finally the men's teeth were examined by a dentist in Boston, and all cavities were properly filled. To further safeguard the health of his men, Byrd took a competent physician who was to give each man a physical examination once a month.

Off for Little America

Byrd's expedition started from the United States in two boats named the *Jacob Ruppert* and the *Bear*. During the weeks at sea the preparations continued. The men carefully weighed out rations (allotments of food) ounce by ounce, and put them neatly into bags, labeling them for use later on long sledging trips. By the time Byrd's ship was nosing its way among the icebergs, many of his preparations for the clothing, food, safety, health, and recreation of his men were completed.

Four years before on a trip to the South Pole, Byrd had established a camp which he called Little America. The camp was made up of several flat-roofed, wooden buildings. These were placed far down in the snow, and tunnels were built through the ice and snow to connect the buildings. The walls of the tunnels were lined with boxes of food. The roofs of the tunnels were made of chicken wire on which was laid waterproof paper. The entire



By Keystone View Co., N. Y.

They saw the towers of Little America

camp had soon become banked and covered with snow. This helped to keep the buildings warm inside.

Byrd had left Little America well provisioned* with food. But nobody knew whether the camp or the food were still there. Could the place survive in an ice age? Would the buildings still be there? Would they be buried under many feet of ice and snow or would the ice on which the buildings had been built have broken away and carried everything out to sea? If the buildings were still standing, would the food be preserved*? These were the questions in the minds of Byrd and his men as they now went ashore. They climbed over the ridges of

ice and finally saw the radio towers of Little America still standing.

The men hurried to the place where the buildings had been. They dug down through several feet of snow into the buildings and found everything much as they had left it. Some of the roofs had sagged under the weight of ice and snow. Both the roofs and the walls of the buildings were covered with a beautiful coating of ice crystals.

The electric lights and telephones were still in working order. The food which they had left was frozen solid, but when heated it was found to be as good as when they left it. The seal meat, whale meat, and beef, which had been left in the storage tunnels, were perfectly preserved. They found the flour, butter, condensed and evaporated milk, canned meats, fruits, fish, preserves and other foods all in excellent condition.

Of this remarkable fact Byrd says: "In the future I believe medical science will use Antarctica for experimentation* because of the extraordinary purity of the air and the scarcity of germs in that extreme cold. Experts of the Rockefeller Institute and other medical men have shown keen interest in this possibility."

Selecting the Men

Supplies were moved with all possible speed from the boats to Little America. At last the boats were unloaded and ready to leave. Byrd was forced to choose the men who were to stay with

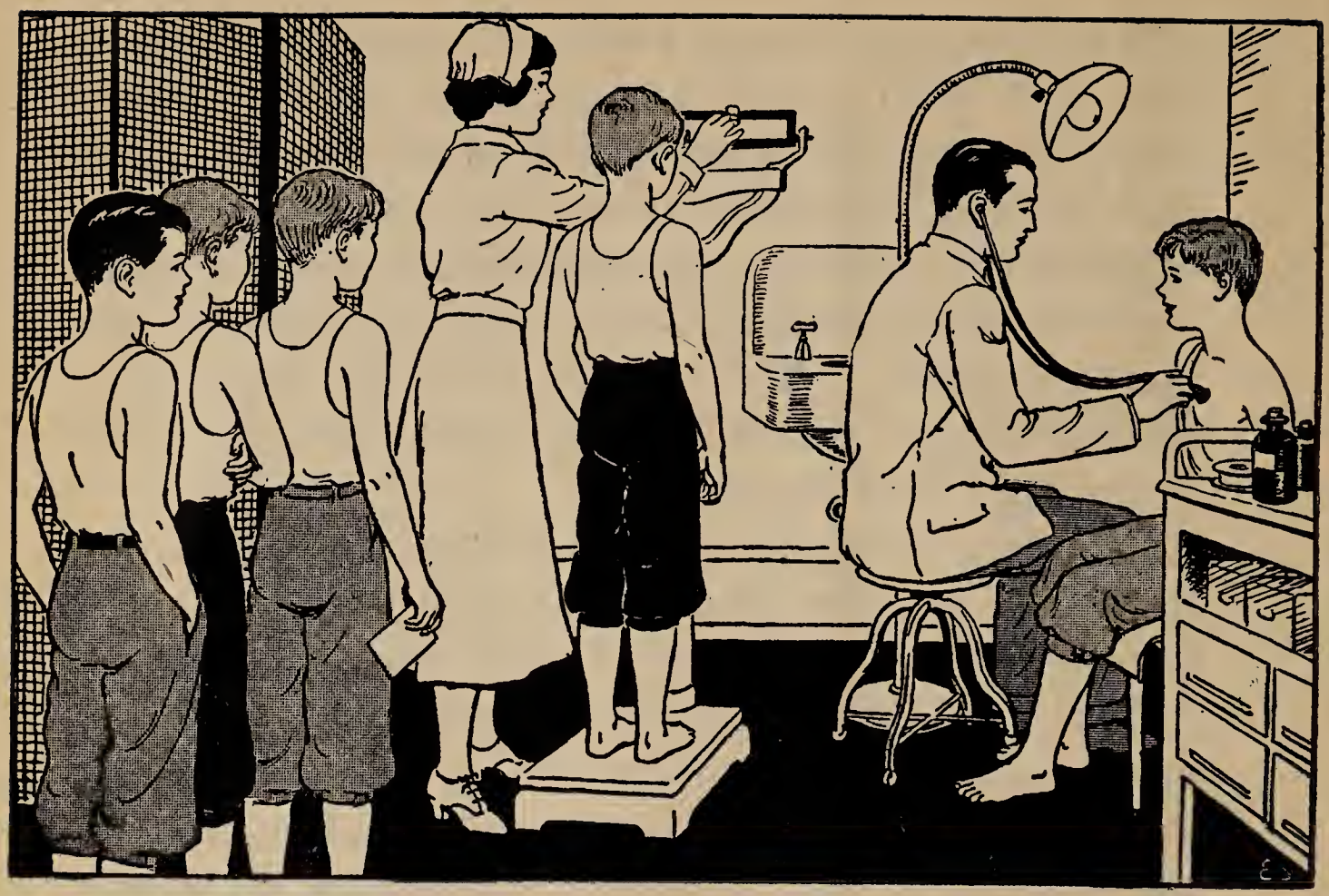
him on the ice. It was a difficult task. He wanted men with both mental and physical health. After the boats had left, there would be no way for other men to join the party or for any member of the expedition to leave. The same small party of fifty-six men would work and eat and live together for many months. The success of the expedition depended upon the character as well as the health of the men Byrd chose.

"Of some men you can be absolutely sure," wrote Byrd. "They are born with stability* and loyalty. Some men are doubtful." Individual initiative* and energy were essential. Byrd tried to select men who had these traits.* Then, just as the ships were ready to leave, the doctor who had come with the expedition had to resign because of ill health and return with the first ship. That left Byrd in a desperate situation.

Getting a Doctor

"Without a doctor," he says, "I should have taken all the ice party back to New Zealand rather than expose them to a year cut off from medical aid."

He got in touch with New Zealand by wireless. He found a doctor who was willing to come. But then there was the great problem of transporting him over two thousand miles to Little America. There are no regular ocean or air line schedules* in that barren* part of the world. The British Government courteously came to Byrd's aid and offered to bring the doctor part of the way on the British boat,



Regular health examinations keep one fit

Discovery II. Byrd's sturdy boat, the *Bear,* met the *Discovery* and brought the doctor the rest of the way back to Little America, making the trip later in the season than any other boat had ever made it.

Being "In Condition"

The semiannual dental examination and the annual physical examinations which boys and girls get in school or in the offices of the family physician are just as important as those Byrd's men received. All boys and girls are starting out on an adventure in living which may some day take them as far as Byrd and his men adventured. The very best way

to keep "in condition" is to have regular health examinations.

Byrd's men had these examinations every month while they were at Little America. It was only by watching the men regularly that the expedition doctor could find the first signs of any physical weakness and prevent disease from developing. The men were weighed at each examination. In this way the doctor could watch each man's weight and be sure that he was getting enough of the right kind of food. Boys and girls should be weighed at least four times a year.

On page 335 are tables showing average weights for boys and girls of different ages, different heights, and different physical types. These are only average weights, but they help a boy or girl to know whether or not he weighs about what he should weigh for a person of his age, height, and type. A young high-school boy or girl who weighs within ten pounds of the average has one sign of good health.

Another sign of good health is absence of colds. When a person is overdoing he is more likely to catch cold. One who has frequent colds is not in good condition.

The Health Examination

At the annual physical examination the physician examines one's vision,* hearing, nose, throat, heart, lungs, digestive system, nervous system, skin, feet, thyroid gland, posture, and blood, and advises what to do for any physical defects which may be found.

One's teeth should be examined twice a year by a dentist. If all parts of the body are in good working order, the person is "in good condition" and ready for sports, work, and all kinds of adventure. If necessary, at the annual physical examination the doctor also immunizes a person against smallpox, diphtheria, typhoid fever, and certain other contagious diseases.

A physician can hardly tell whether a person is in the best possible condition by seeing him only once. It is by seeing a person repeatedly or by studying the history sheet of one's previous physical examinations that a physician can watch the condition of a boy or girl and help him to grow steadily stronger. After each health examination a boy or girl must do all that he can to correct any physical defects which are found.

Things to Do

1. Of course you know how old you are. Do you also know how tall you are and how much you weigh? Even if you know your height and weight, it is a good thing to measure them during the first few days of a new school year. Perhaps there is a physician or nurse at your school who measures your height and weight. If you have no school doctor or nurse, ask your teacher if your class may measure the height and weight of each pupil. If a school nurse or your teacher has not given you a height-weight card for you to fill out, make one like the card shown on the opposite page.

After you have made your height-weight card, turn to page 335 and look at the table there. You will see that the table gives the average height and weight of boys and girls of different ages and three different body types. After discussing it with your teacher, decide whether you are of the tall, slender type; the short, stocky type; or the average type. Then find the weight in the table which corresponds

School_____

Name_____

Year	Height in Inches	Weight in Pounds	Gain in Weight	Loss in Weight
Sept.				
Oct.				
Nov.				
Dec.				
Jan.				
Feb.				
Mar.				
Apr.				
May				
June				
July				
Aug.				

Your weight card

to your age and height. Fill out your height-weight card. Do you weigh too much, too little, or is your weight just right for your age and height? Talk it over with your parents, your teacher, and the school nurse and decide whether you should do anything about your weight.

★ **2.** Write a story about some trip you have made. Be ready to read it to your classmates.

★ **3.** Be ready to tell your class about the lessons you learned from the story of Admiral Byrd's trip.

★ **4.** Imagine how Little America looked and draw a picture of it.

By Keystone View Co., N. Y.

CHAPTER II

Living in a Land of Ice

Safety Measures

After the *Bear* left for the last time, Byrd and his men were completely shut off from the outside world except by wireless. Apparently Byrd did not overlook anything possible to insure the health and safety of his ice party. He had the buildings built at some distance from one another so that if fire should break out in one building, it would not reach the others. A night watchman made hourly rounds of the camp to watch for fires.

When a party started on a trail trip, they took along large numbers of orange flags. These were stuck in the snow at regular distances to mark the trail so that it would be possible to find the way back. The long and careful preparation for these trips with careful checking and rechecking of details is another example of how trouble and accidents were avoided.

Byrd and his assistants tried to foresee every danger so as to avoid it or be prepared to meet it. For example, in Byrd's diary (daily record) of the trip to Little America he made the following entry: "We are hardly likely to encounter icebergs this far north, but to be on the safe side, lookouts were stationed in the eyes* of the ship. Heavy clothing was distributed to all men on watch."

These words, "To be on the safe side," seem to influence Byrd's every act and go to prove the old saying that caution is the better part of valor (bravery). At another time, when Byrd decided to make an airplane flight for exploring* purposes, he expected to be gone less than a day. But he ordered the plane to be stowed with one month's rations and full camping equipment for five men. Every item was checked and rechecked, weighed, and carefully stowed. No wonder that he could establish such a remarkable record for safety!

Crevasses

Crevasses (deep cracks in the ice) are a great danger in the Antarctic. These great cracks in the ice often measure several feet in width and are sometimes almost bottomless. They have a way of getting bridged over with a thin layer of snow and ice so that they cannot be seen. Often this layer gives way unexpectedly when dogs, sledges, men, or tractors are passing over them. One driver saw his dog team disappear before his eyes as if wiped out by magic. They had fallen into a crevasse! To

By Acme, N. Y.

Arctic travel is hard and dangerous

combat this danger, the men put special safety devices on their tractor doors to pull them open on short notice and allow the men to escape. The harness on the dogs made it possible to pull up many a husky (an Eskimo sledge dog) when he dangled over the side of a deep crevasse. When traveling on foot, the men often tied themselves together with ropes, and wore skis and snowshoes. "Many a polar traveler," says Byrd, "has been lost for want of a ski or snowshoe."

Another Danger

The men were still busy hauling supplies and rebuilding Little America when it became evident that the ice upon which the camp was located was not entirely safe. Great cracks encircled their settlement, and the ice on which they were living was gently rising and falling with the ocean swell.*

There was a possibility that this ice might break away and carry them all out to sea on an iceberg.

The situation was critical, and it was characteristic of Byrd that he called all his men together and worked out with them a plan which would best serve all their needs. It was decided not to leave Little America but to establish another, safer base of supplies, called Retreat Camp. Meanwhile watchmen were to report any change in the condition of the cracks in the ice around Little America. Thus, having taken what they thought were the best possible precautions, the men went about their daily tasks and hoped for colder weather to freeze up the treacherous* cracks.

Appendicitis and Fire

In the meantime another dangerous situation arose. One of the men was taken ill with appendicitis (inflammation of the appendix*). The doctor felt that an operation was necessary. But having been in camp less than two weeks, the doctor had not had time to unpack his instruments. When trying to get them, his pressure lamp went out and while filling it with gasoline the gasoline caught fire and started a serious blaze. The crate in which the surgical instruments were packed also caught fire. By quick and careful action other members of the party with fire extinguishers and gas masks rescued the instruments and put out the blaze.

Then another problem had to be solved before they could operate. Ether, which was to be given as an anesthetic,* is highly inflammable. How could they keep a room warm enough for an

operation and yet not have any open fire to cause the ether to explode? They plugged all the cracks, heated the room to 80° F. and then carried out the hot ashes. Even so, by the time the operation was finished, the room had grown very cold. But the patient recovered, and Byrd still maintained his record of never having lost a man.

Advance Weather Base

One of the special purposes of this second antarctic expedition was to make valuable weather observations. In order to do this, Byrd planned to establish an Advance Weather Base four hundred miles nearer the South Pole than Little America and to man it with three men for the long winter night. In that part of the world there comes a day about the first of May when the sun sets and does not rise again for four months. At times there is not even a moon to give light, and the cold is intense. Byrd was unable to carry out his original plan for an advance base as close to the pole as he had hoped, but he did establish a base one hundred miles south of Little America. Because he could not make the base large enough for three men, he planned to live there alone for seven months to make weather observations.

Here is a summary of the orders Byrd left behind when he set out for Advance Base.

1. Work industriously.
2. Make and abide by strict rules of safety as to fires, getting lost in storms, or falls into crevasses.

3. Conservation of food, fuel, clothing, and shelter is of vital importance.

4. Every man has equal right to be treated fairly and squarely. Remember that you are living in a very simple way. The humblest work is very important. A man will be judged not by the position he holds so much as by the way he plays the game and does his job, however humble it may be.

Before darkness set in, Byrd was living in the tiny new camp, Advance Base, all alone. He had a small radio with which to keep in constant touch with his men at Little America. And at Little America the men were busy carrying out Byrd's orders and preparing for the spring trail trips.

Clothing

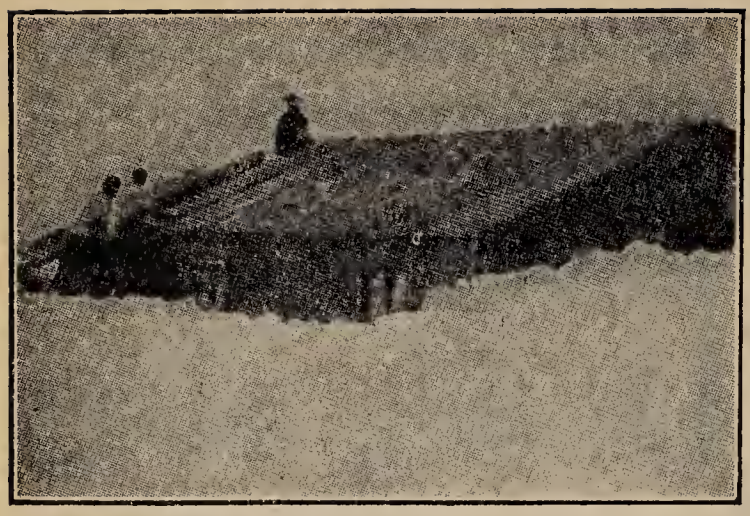
The way Byrd's men dressed changes the usual ideas about how to keep warm in a cold climate. It is very natural to think, "The colder it is the more clothing for a cold climate." As if in answer to this we find a member of the expedition telling about the men working, stripped to the waist although the temperature was well below freezing. Another account says, "It was unnecessary to wear an excessive amount of clothing. Ski boots, two pairs of woolen socks, a woolen shirt, trousers, and light silk-and-wool underwear, a helmet, mittens with double inner liners, and light, windproof pants and parka* were all you needed for brisk ski-running." This was in the coldest weather. In February, they could work outside wearing only a

New ideas in polar clothing

light shirt, breeches, underwear, shoes, and a single pair of socks.

On three occasions the temperature crossed −70° F. Despite the extreme cold, at least half a dozen men were out skiing several hours every day. They worked outside for hours at a time with no great discomfort at 60° below zero. Furs were used only during flights and in tractors when men had no opportunity to exercise, or in camp on the trail at the end of the day's march.

It was the wind that was so hard to bear. In a fair breeze at −30° the men suffered more than in still air at −70°. Against drifting snow there



A hut in Little America

was no protection, and it was torture to have to sit still hour after hour in a freezing tractor unable to get the circulation back into hands and feet. The men kept warm by exercising and by wearing windproof clothing rather than by wearing excessive amounts of clothing. From this fact might come some rules for everybody:

1. Study the wind as well as the thermometer when dressing for the weather.
2. Protection from wind is more important sometimes than very heavy clothing. Windproof garments need not be heavy.
3. Exercise will help to keep one warm.
4. When sitting still and not exercising, warmer clothing is necessary.

Frost Bites

When out of doors in bitter weather the men carefully watched one another's faces for the patches of dead white which meant frostbite. A person whose face is frosted does not feel it, but another person can easily see it. As soon as a person discovered that he was frostbitten he carefully molded the spot with warm, bare fingers. Soon he felt a painful rushing of blood back through the affected* flesh. After that he went back to work. Frostbite

of hands and face was common, and the men had to accept it as part of life in the Antarctic.

The Daily Routine

Of just as great importance as what these men wore is what they did. The daily routine at the base camp during the long winter night is interesting. At ten o'clock all lights were put out and no more coal was put on the fire. The doors were opened into the tunnels for ventilation. On colder nights the temperature in the shacks got as low as −25° F.

The men were called at seven o'clock. They found it hard to get up in the morning. The expedition doctor thought that this was due to three causes:

1. Poor ventilation in the shacks,
2. The great cold which seemed to sap their energy,
3. A slowing up of the bodily processes caused by lack of fresh food and sunshine.

It seemed to take longer to get rested after long exertion and even small cuts healed slowly.

Breakfast was served about seven-thirty. At noon the men ate a light lunch consisting of pea soup, salami,* corned beef, sardines every other day, coffee or cocoa, and, occasionally, dessert, almost always canned fruit.

Supper was the heavy meal of the day. There was a soup, a meat course, two or three dehydrated vegetables, fresh bread, a dessert, and coffee. Because part of their beef had spoiled on the ship coming down, they were practically out of fresh beef

by the end of the winter. Then for meat they had "salt horse,"* ham, pig's knuckles, mutton, and seal meat. There was enough chicken for them to have it once in awhile on Sundays.

For recreation the men often went skiing, and besides outdoor activities they had a library of many books. There were also movies three evenings a week at seven o'clock.

From the second-in-command on, the men took turns at working in the kitchen, or doing "mess duty," as they called it. When on mess duty they had to report for duty at 6:15 every morning in the galley (kitchen). Byrd knew that people are healthier and happier if they plan their days. Everyone should have regular hours each day for going to bed, getting up, working, eating meals, exercising, and quiet study.

Bacteria

To those who think of colds in connection with cold weather, it will seem strange indeed to find that in Little America colds were almost unknown. Probably the men developed an immunity* to the germs* they brought with them, and as long as no new germs were introduced there were no germ-borne diseases. It is also interesting to know that bacteria, probably not the disease-producing kind, were found by members of Byrd's expedition in snow at a temperature of $-50°$ to $-60°$ F. It has generally been thought that such cold temperatures would kill bacteria as well as all other kinds of life.

Everyday Living

It is not just knowing what to do in an emergency* that makes living safe and pleasant. It is still more the activities that are repeated every day. Many explorers have failed to reach their goal because of lack of strength or prolonged exposure or illness brought on by inadequate* or wrong diet. The daily living habits at Little America show how the details of food, safety, clothing, ventilation, shelter, rest, and recreation were intelligently carried out. Throughout his accounts of the expedition, Byrd recognized that strength of character in his men was of first importance.

Things to Do

1. Write out a list of clothing you would take on a camping trip in the summer.

2. Write out a list of clothing you would take on a camping trip in the winter.

3. Be ready to tell why you did not write the same list of clothing for both the winter and summer camping trips.

4. Make a daily schedule for yourself tomorrow. At the end of the day compare your schedule with what you did. Discuss with your parents and your teacher how you might have used your time better.

★ **5.** Keep a diary of your activities for a week. Discuss with your parents and your teacher how you might have used your time better.

★ **6.** Write a story based on your diary.

CHAPTER III

A Successful Adventure

Contacts with Byrd

While all the work was going on at Little America what was happening to Admiral Byrd at his Advance Weather Base? It had been March 28 when he began his lonely life. For the first three months his radio messages came through regularly, and he frequently consulted with various officers concerning their plans for the spring field trips. In July his messages were not so clear as usual. He said that his generator* had given out and that he was using a

hand-operated one, so the men did not suspect that anything was wrong with Byrd himself.

About the first of July one of the men decided that he would like to join Byrd at Advance Base for some special observations. But Byrd had left orders that under no conditions should an attempt be made to reach him so long as the darkness held. The men communicated with Byrd by radio and told him their plans. Byrd said he would approve the project, but he insisted that no risks be taken. Little did the men dream that at that very time Byrd was desperately in need of help. He had been poisoned by fumes from his stove and was so weak that he could not properly prepare his food. He was using what little strength he had to keep in touch with his men so that they would not worry about him. He would not tell the men of his condition or let them take any risks to join him, and the tractor which started out was forced to return without reaching Byrd.

Off to Advance Base

It was not until August that the men at Little America realized that something was seriously wrong with Byrd. He had refrained from telling them anything. But his radio messages had become very short and slow. Although he invariably signed off with "O. K.," they knew that he must be in trouble. They determined to send a tractor and a party of three men to his rescue. Through the darkness of the polar night a tractor made its way southward. The men followed as best they could the trail of

orange flags which had been laid in March when Byrd went to Advance Base. After a terrible trip, they finally sighted one of the flares which Byrd, in spite of his weakened condition had kept burning. As they came to Advance Base, Byrd in furs came toward them saying, "Come on down, fellows, I have a bowl of hot soup for you."

It was two more months before Byrd was strong enough to travel. On October twelfth an airplane was sent to Advance Base, and in a few hours Admiral Byrd was safely back at Little America. His record of not having lost a man on a polar expedition was still unbroken.

Byrd, the Leader

Byrd was an ideal leader. He let his men know that he valued their opinions. He often consulted with them when there were important decisions to make. He appreciated those men who were so generous and courteous that they would willingly tramp out in a blizzard to dig out gas drums for the power plant. He also appreciated those who helped the messmen during dinner rush.

He praised the ones who always seemed to see the broken things about camp and get them repaired, and he says he has never forgotten those who got busy to dig out tunnel entrances after a blizzard, or were willing to stop along the way to give a helping hand. "When you are weariest," said Byrd, "and most despondent, an unexpected act of courtesy or generosity illuminates the day."

When Byrd returned from Advance Base the scientific parties were about ready to start out on the field trips for which they had been preparing all winter. In speaking of these trips Byrd makes an observation which holds true for school projects as well as for Antarctic operations. He says:

"Getting a party off, whether it is for sledging, tractor, or aviation, is always a major expedition problem. The fault isn't hesitation or reluctance.* It's just the human quirk* of tinkering, of altering and changing little things, sledges, rations, gear and the like—somewhat like trying to get the family organized for a picnic in the country."

To know how to avoid "that human quirk" and get started is one characteristic of a good leader. Byrd describes another characteristic.

"A leader," he says, "should select from the myriads (very large number) of opportunities available those objectives which are at once valuable and reasonably accessible."*

Not a Man Lost

When the field parties had at last done their difficult and important work, they returned to Little America, not only without loss of a life, but in good physical condition. The ships were loaded and the expedition finally headed for the United States.

"And above all else," said Byrd, "what means more to me than anything else—is that we left not a single man in Antarctica, and for that we give thanks to Providence."

What kind of man is Byrd? The following quotation from a Naval Academy publication shows what Byrd's classmates thought of him:

"Richard Evelyn Byrd: Athlete. Leader in all right things. Friend. Gentleman. From the time we entered as plebes,* until the present, Dick has been putting his whole heart into everything he does. Most of the time Dick moves around with a faraway look in his eyes. But go where he may he cannot hope to find the truth and beauty of which he dreams. He has already lived a life rich in experience and he will live a life richer still. But he will always give to life more than he takes."

We find in the official records of the United States Navy the following description of Byrd by his superior officers. It was made long before Byrd became famous: "Co-operative qualities, devotion to duty, education, force, industry, initiative, judgment, justice, leadership, physical energy and endurance, reliability, self-control."

This is the man who holds the five highest medals the country can give and has a total of twenty-two citations, nine of which are for bravery and two for extraordinary heroism in saving lives.

Few people have such success as Admiral Byrd has had. Not many live lives so full of high adventure. It was while Byrd was still in school that he showed such characteristics as friendliness, leadership in all right things, and the habit of giving to life more than he took. Boys and girls who seek adventure

and a joy in living can cultivate these traits of character every day. They can also try to be like Byrd in physical energy and endurance, reliability, self-control, and co-operative qualities.

Satisfaction from "Doing"

It is interesting to read about Byrd and his hazardous adventures. It is inspiring to read about such courage and ability, but in doing so boys and girls are getting their experiences secondhand. They are enjoying only what Byrd and his men enjoyed and living over adventures which have already been done. It is generally agreed that the greatest joy in living comes from firsthand accomplishment. Byrd and the men who went with him to Little America had the thrill and the satisfaction of actually doing what others can only read about.

It was while Byrd was still in school that he began preparing himself to accomplish great things. He himself probably had no idea what these things would be. He took part in athletics and developed such characteristics as friendliness, leadership in all right things, and the habit of giving to life more than he took. Boys and girls who are in school today will be the heroes of tomorrow. Those who are prepared can be "doing" instead of only reading about what others have done.

Our country needs more leaders and citizens of the type of Byrd. How can young people prepare themselves to fill this need? First, they can read much about men and women who have contributed to our

knowledge or helped to make living pleasanter for everyone. They can learn the value of physical efficiency* and how to acquire* it. They can also learn about a healthy personality and how to acquire that.

Physical Efficiency

Physical efficiency requires developing one's body so that it will be a help rather than a handicap to living. "After graduating," a friend of Byrd's tells us, "Byrd kept up a rigorous* regime* of exercise and sports which kept him so physically fit that when leaving on his first expedition his condition was as good as during Academy days."

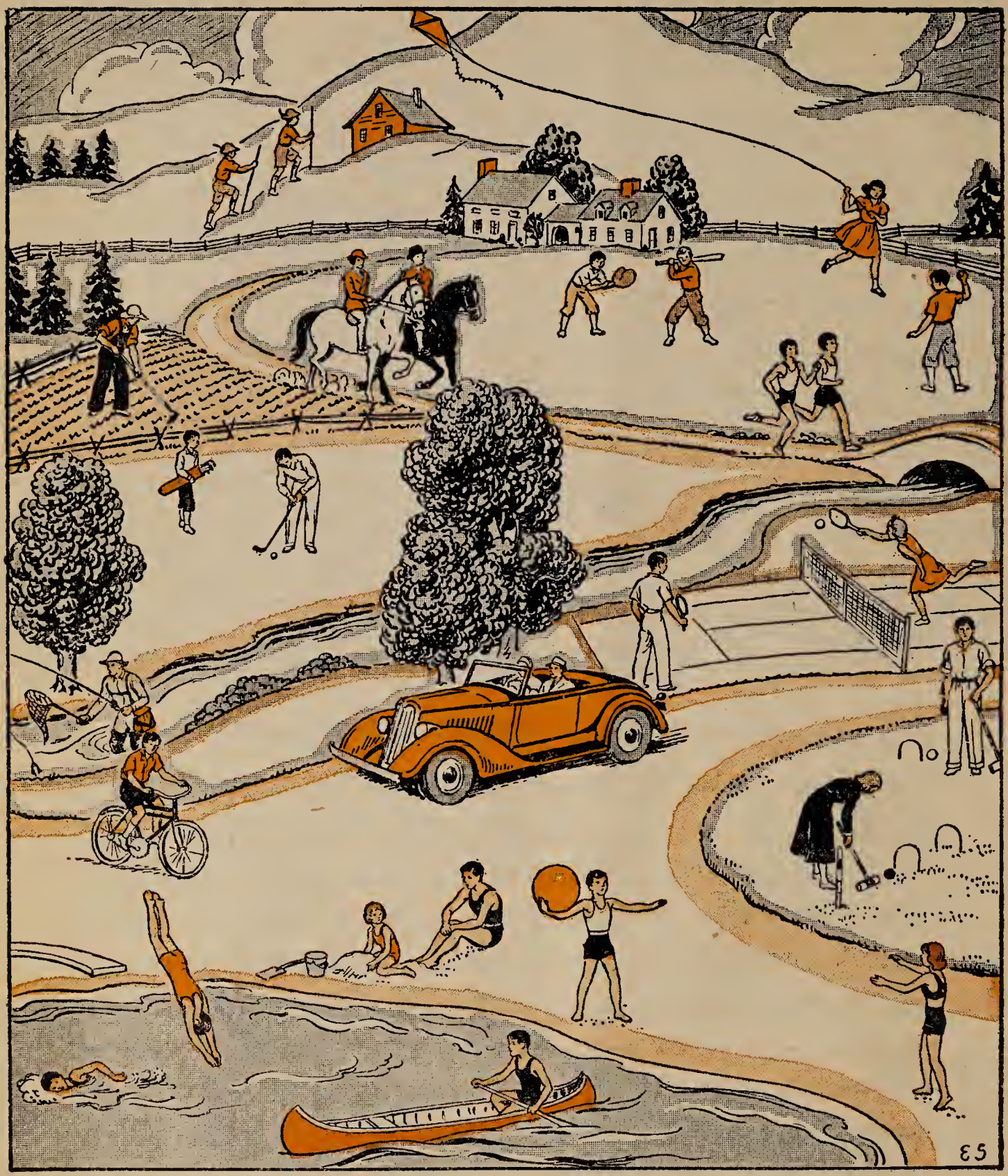
Exercise and sports develop the muscles of the body. No part of the body is independent. What benefits one part, benefits other parts at the same time. What affects one part of the body affects the entire body. The big muscles of the arms and legs, back, chest and abdomen* make up a large part of the body bulk. When they are used, heat is produced for the body. Physical activity causes the blood to flow faster. The nerves, digestive organs, heart, brain, and respiratory systems all benefit by the increased blood supply.

The muscles of the arms, legs, and back and many other muscles of the body are controlled by the brain. That is, a person moves his arms when he wants to do so. He knows when they are moving. He can stop them from moving when he wants to do so. These movements are called *voluntary movements.*

By H. Armstrong Roberts, Phila.

Exercise develops the muscles of the body

There are other muscles in the body which move without the person knowing that they are moving. The heart beats whether or not one wishes it to beat. The muscles in the blood vessels tighten up or contract, and loosen or relax, to regulate the amount of blood which passes through. A person never knows when this is happening in his body. Neither does he know when the muscles of the digestive tract are relaxing and contracting. The movements which go on without one's knowing it are called *involuntary movements.* The movements of breathing are both kinds, voluntary and involuntary. If a person tries to hold his breath, he can do so for a certain length



Everyone should take some exercise. Different persons are suited to different sports. Tell what people should not attempt some of the sports pictured here. Why?

of time, but after a while he must breathe whether he wishes to or not.

Exercise

Practice in games and sports and good posture trains and strengthens muscles which control both voluntary and involuntary movements of the body. There are very good reasons, then, why everybody should take some form of daily physical exercise. Because fresh air and sunshine are as necessary as exercise, outdoor activities are best. Hiking, gardening, tennis, swimming, and skating are some of the best forms of outdoor activity. They can be carried on when one is grown. Grown people need exercise, too, but they do not need so much as boys and girls. Kittens and puppies are jumping, running, and tumbling around every minute that they are awake. Children seldom sit still if they are healthy. Exercise promotes growth. That is why boys and girls need more exercise than adults. Exercise speeds up bodily processes. More food and oxygen* are carried to the cells,* more waste is carried from the cells. The entire body is benefited.

Exercise, like anything else, must not be overdone. Rest is as necessary as exercise. It is during rest that the cells of the body have an opportunity to rebuild themselves. Everyone has experienced the sore muscles which come from too strenuous exercise. Exercise violent enough to cause such soreness is unwise. The body can become accustomed to the most strenuous exercise if it is trained gradually.

By Underwood & Underwood, N. Y.

Puppies at play

Such training is good for one. For example, a boy scout who is planning to go on a mountain-climbing expedition during summer vacation should begin taking ordinary hikes early in the spring. He can make these longer and harder each week until his muscles are developed to endure hard mountain climbing without undue strain. After he left college, Byrd kept up a rigorous regime of exercise and sports. That is why he could endure hardships and strains that would have been impossible for many

men of his age. It was undoubtedly due only to his excellent physical condition that he survived the terrible ordeal at Advance Base.

Physical activity must always be adapted to the individual. Not all persons are alike. Each must find his own limitations and live within them. A person with a weak heart needs physical activity but not strenuous exercise. A physician can prescribe the correct amount, and anyone, by studying himself, can discover his limitations. Exercise is very harmful to a person with tuberculosis* and may be harmful to one recovering from an illness. One with a physical handicap must find some suitable exercise. Swimming is suitable for a person who has had infantile paralysis.*

The Importance of Posture

Good posture makes all exercise more effective. Look at a picture of Admiral Byrd. He always maintains correct posture. It is probably the years of training at the Naval Academy which developed his muscles correctly. After such training it would be impossible for a man to walk in a stooped, slouchy way.

While training and practice are important in developing good posture, good nutrition is also necessary. Bones and muscles are built from the food we eat. Proper food enables the body to build firm, straight bones and strong muscles. Ill-fitting clothing and especially tight bands and wrong shoes affect posture. The habit of carrying books, newspapers, or any heavy load always on one side will often cause a

Compare the children in these two pictures

shoulder and hip to be higher on one side than on the other. Correct furniture at school and at home, and correct lighting are aids to good posture. Freedom from physical defects such as flat feet, near-sighted eyes, and deafness will all help one to maintain good posture.

Here are some ways to improve one's posture:

1. Correct physical defects, if possible.
2. Improve habits of standing, sitting, walking, and lying in bed.
3. Build strong muscles by exercise, fresh air, rest, and nourishing food.
4. Maintain a happy, cheerful disposition.

In which picture have they the better posture?

Healthy Personality

A person cannot be completely healthy unless he has a healthy personality. Here is a list of traits and habits which indicate a healthy personality:

1. Is interested in friends, games, and hobbies.
2. Wants to find out about the world in which he lives.
3. Sticks to a thing.
4. Pays attention to the work he is doing.
5. Finishes tasks he has begun.
6. Is prompt in getting to work. Does not put things off.
7. Is truthful.

8. Enjoys playing.
9. Enjoys working.
10. Shows courage in meeting disappointments.
11. Forgets grudges quickly.
12. Controls his emotions.
13. Assumes his individual part in group undertakings.
14. Is willing to share what belongs to him.
15. Settles difficulties without appealing to some other person.
16. Keeps his hands off other people.
17. Works cheerfully even under trying conditions.
18. Is thrifty with time and materials.
19. Is orderly.
20. Can think himself out of a difficulty.
21. Faces problems squarely and tries to solve them.

Do You Know?

Below are some questions. Study these questions and see if you can answer them. If you cannot answer any question, either turn to the page number following the question and study that page or, if the question has no page number after it, discuss the question with the teacher. After you have studied all the page references or have discussed the questions with your teacher, see if you can answer all the questions.

1. What was the most important factor in the success of Byrd's trip to Antarctica? (page 2)
2. What disease was common among Arctic explorers? (page 3)

3. Why did the Arctic explorers have this disease? (page 3)

4. How did Byrd prevent his men from having this disease? (page 3)

5. Why did the men who went with Byrd to the Antarctic have to have their diseased tonsils or abscessed teeth removed? (page 6)

6. What is the best and safest way to check your physical condition? (pages 10–11)

7. Do you know whether your physical condition is such that you could stand the hardships of a long trip?

8. What does a good physical examination include? (page 11)

9. Why is it just as important for boys and girls to have a physical examination as it was for the men who went with Byrd to have a physical examination? (page 10)

10. Do you have colds frequently?

11. Do you believe that you are in good physical condition if you have frequent colds? (page 11)

12. What clothing is most suitable to wear under various weather conditions? (page 22)

13. How should you dress for the outdoors in summer?

14. How should you dress for a cold winter day?

15. Why should you wear different clothes for a cold, windy day than for a cold day that is not windy? (page 21)

16. Do you know why weather observations are valuable?

17. Do you know why the sun sets about the first of May and does not rise again for four months in the Antarctic?

18. Do you know why you need more clothes to keep warm when you are not exercising than you do when you are exercising?

19. Why do you enjoy reading stories of men and women who have done things?

20. Why is it that more stories are not written about people who have been doers?

21. Do you ever have a feeling of satisfaction after having accomplished some work or task?

22. Are you doing things every day that will help prepare you for bigger things when you "grow up"?

23. Do you follow any program of physical exercise that will develop your muscles?

24. What sports do you take part in?

25. Are all forms of exercise good for all people? (page 37)

26. What effect does physical activity have on your body? (page 32)

27. Which parts of your body benefit from an increased flow of blood to such parts? (page 32)

28. What are the two general kinds of movements that are to be found in your body? (pages 32-33)

29. What are the movements of your body that go on without your knowing it called? (page 33)

30. What is posture? (page 5)

31. Is your posture as good as that of the boys and girls with whom you play?

32. What are some kinds of exercise that will benefit your posture? (page 38)

33. Why do growing boys and girls need more exercise than do adults? (page 35)

34. Why is it unwise to overexercise? (page 35)

35. Do you know about the part of your body that controls your voluntary movements? (page 32)

36. Do you know why your body should be physically efficient? (page 35)

37. Do people of all ages need the same kind and amount of exercise? (page 35)

38. Do you know how to control your feelings?

Things to Do

1. Write ten reasons why it is important for you to be physicially efficient.

2. Write some good rules for exercise.

3. Write some posture rules for standing, sitting, walking, and lying in bed.

4. Check the list of characteristics of a healthy personality given on page 39. See how your personality compares with this list.

★ **5.** If you have time, draw some posture posters.

★ **6.** If you have time, write a story about "A Healthy Personality," and be ready to read it to your classmates.

By Mattie Edwards Hewitt

CHAPTER IV

Foods and Diet

Food Preparations

Byrd and his men devoted much care to the preparation of their food. The food used on a trail trip was especially prepared. It was chosen after careful scientific study. A well-balanced diet for men doing hard physical labor in a cold climate was determined. "A lemon powder," says Byrd, "containing the important vitamin* C was carried for its anti-scorbutic* properties. Scurvy has taken a heavy toll in polar regions." In order to reduce the weight of packs, only exact amounts of food were carried.

A day's rations for one man consisted of:

RATION I

	OUNCES		OUNCES
pemmican (ground beef squeezed dry and then mixed with fat)	9	Erbswurst	2.9
Eskimo biscuit	10	peanut butter	.29
sugar	4	tea	.5
oatmeal	2	butter	.59
chocolate	2	malted milk	.74
bacon	1.33	cocoa	.5
		salt	.236
		pepper	.029

Meals on the Trail

Routine meals on the trail were prepared from the foods listed in the table above. They consisted of:

Breakfast: two mugs of oatmeal with sugar and milk, two biscuits, two cups of tea with sugar and milk. Snow was melted to make water for the tea.

Luncheon: one two-ounce bar of chocolate, two biscuits with butter or peanut butter, two ounces of pemmican eaten cold, and two cups of tea, cocoa, or malted milk.

Supper: six ounces of pemmican in hot stew or hash made with soup meal sausage, four biscuits with butter, peanut butter, or bacon fat, two cups of tea, and two slices of bacon.

Because of a shortage of some foods, a radio request was sent to United States food experts to revise the rations. After they had worked out a substitute the following rations were used:

RATION II

	OUNCES		OUNCES
pemmican	1.5	lemon powder (contains vitamin C and prevents scurvy, as does fresh seal meat)	.35
fat cereal	5.5	tea	.5
Eskimo biscuits	10.0	cocoa	.5
butter	2.0	dried apricots	.5
sugar	3.5	dates	.5
powdered milk	4.5	dried spinach	.25
oatmeal	2.0	salt	.5
chocolate	2.5		
Erbswurst	1.5		
bacon	1.5		

To test the efficiency of this new diet the doctor weighed each man of the tractor party before and after a long tractor trail trip. In that way he could pretty well tell how these men had fared on the new rations. The men showed slight, but not serious, losses in weight. Thus did Byrd recognize the importance of diet to the health and efficiency of his men.

Food Essentials

The essentials of any diet are proteins, fats, carbohydrates, mineral elements, vitamins, and water.

Proteins are the building materials from which new cells are made for the body and old cells renewed and repaired. They are found in milk, eggs, meat, fish, cheese, and the legumes, which are peas, beans, and lentils.

Fats and carbohydrates are the fuels which provide heat, energy, and power for the body. The body needs some of each. Fats are found in nuts,

butter, cream, milk, meat fats, and salad oils. Carbohydrates are found in cereals, fruits, vegetables, milk, breads, sugars, jellies, and desserts.

Mineral Elements

The most important mineral elements found in foods are calcium, phosphorus, iron, copper, and iodine. Mineral elements have many uses. They are sometimes called *salts*, or *ash*, because they cannot be destroyed by burning. Calcium and phosphorus form the hardness of bones and teeth. They help the heart to beat normally and the blood to coagulate.* Milk and leafy vegetable foods are richer in calcium and phosphorus than are grains and fruits. Iron is found in the red blood cells. It enables them to carry oxygen to the other cells of the body. Egg-yolk, red meats (especially liver), green vegetables, and whole wheat are the foods richest in iron. Copper helps the body to use the iron which is needed in red blood cells. A diet containing green vegetables, milk, eggs, and meat will provide enough copper for a healthy person.

Iodine helps the thyroid* gland to do its work properly. Only boys and girls living in the "goiter* belt" need to have more iodine than they get in their food. In many schools in the "goiter belt," a strip of territory extending across the northern part of the United States from Boston to Seattle, the Board of Health provides iodine in the form of chocolate-coated tablets. These are given to all school children to prevent goiter.

There is no need to bother about the other mineral elements which the body needs. A diet which contains calcium, phosphorus, iron, copper, and iodine will contain all the other mineral elements needed by the body.

Vitamins

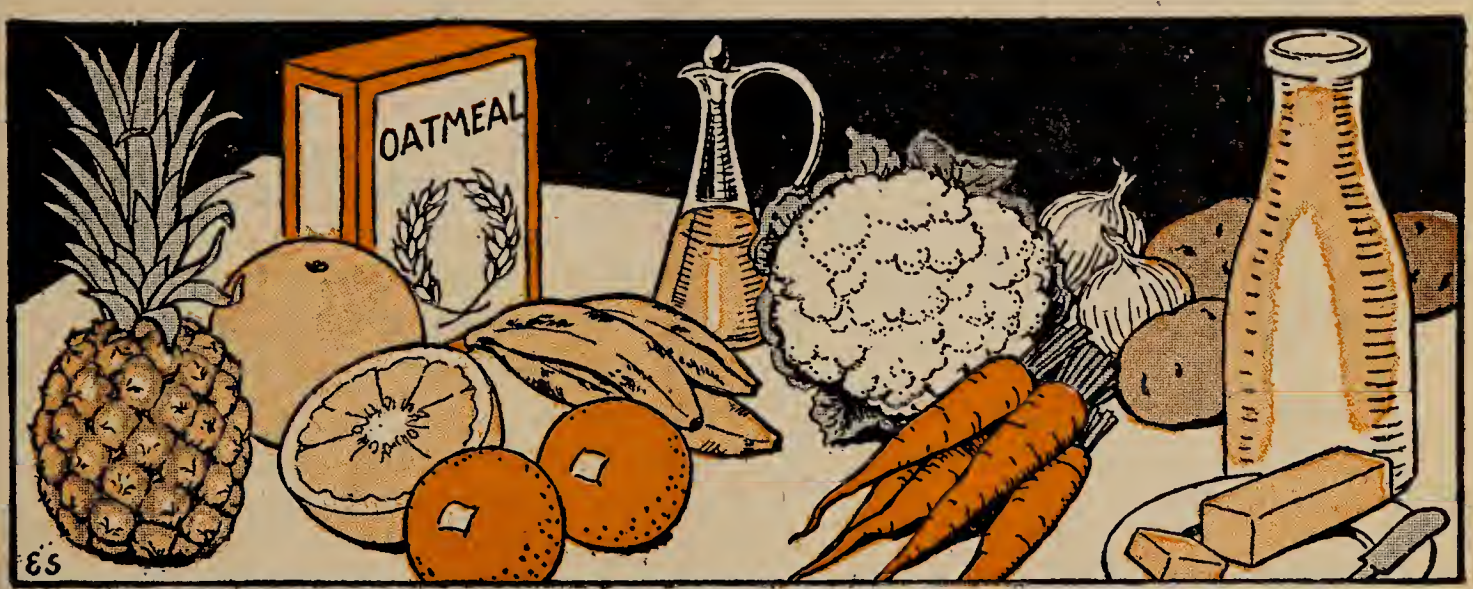
Vitamins are food elements which help growth and normal development of the body. They prevent sickness and increase the appetite. They are named after the letters of the alphabet, A, B, C, D, E, G. They are provided if one eats milk, eggs, raw fruits and vegetables, cooked fruits and vegetables, and cod-liver oil.

Water

Water is an important part of all the body cells. They contain a water fluid and they are surrounded by a water fluid. They can use only those foods which are dissolved in water. Water was the only food essential to be found along the trails which Byrd's men were to follow. Clean snow could always be melted to make water. The largest part of all foods is water. The body is about two-thirds water. But water is heavy. Therefore, Byrd planned to take foods which contained as little water as possible but which contained all the other essentials for a well-balanced diet. Pemmican contains meat with the water squeezed out. Dried milk and fruits and vegetables contain all the essentials of these foods except the water. On

These foods are especially rich in proteins

These foods are especially rich in minerals



These foods are especially rich in carbohydrates

page 51 is a chart which shows how the various food essentials were supplied by one day's rations.

Planning Meals

The table on page 51 shows the food essentials contained in Byrd's rations. Many of these foods were rich in fats. That was because fat contains many calories. A calorie is a certain amount of heat or energy. The amount of food your body needs is not measured in pounds or quarts, but it is measured in calories. Scientists have tested different foods to find out how many calories there are in each kind of food. A tablespoonful of fat contains a hundred calories. The table below shows that very few foods other than fat contain 100 calories in one tablespoonful of food.

AMOUNT OF FOOD REQUIRED TO MAKE 100 CALORIES

FOOD*	SIZE OF SERVING
whole-wheat bread	two slices—2½ inches by 2¾ inches by ¼ inch
graham crackers	two crackers
white sugar	two scant tablespoonfuls
oatmeal	one cup
butter	one scant tablespoonful
milk	five-eighths of a cup
cheese	one and one-eighth inch cube
potato	one medium
apple, orange, or banana	one large
lean steak	slice—2 inches by 1½ inches by ¾ inches
shredded cabbage	five cups
carrots	four or five young carrots
tomatoes	two or three medium or 1¾ cups canned

* From Rose, *Feeding the Family.*

Byrd's men were doing the very hard labor of a trail trip. Therefore they used up a large amount of heat and energy. They needed food rich in calories but light in weight. That is why their rations contained so much fat. A person doing hard physical labor can digest fat more easily than a person getting less exercise. But Byrd's men could not live entirely on fat. Nobody could live entirely on any one food. The most wholesome diets contain a variety of foods and all the essentials of a well-balanced diet. They also contain enough calories, but not too many.

FOOD ESSENTIALS TO BE FOUND IN TRAIL RATIONS I AND II

	Fats	Carbohydrates	Protein	Minerals	Vitamins*				
					A	B	C	D	G
Pemmican	I II	....	I II	....	..	..	..	..	..
Eskimo biscuit	I II	I II	I II	I II	I II	I II	..	I II	I II
Sugar	....	I II	....	....	..	..	..	..	..
Oatmeal	....	I II	....	I II	I II	I II	..	..	I II
Chocolate	I II	I II	....	I II	..	..	..	..	..
Erbswurst	....	I II	I II	I II	I II	I II	..	..	I II
Bacon	I II	....	I II	....	I II	..	..	..	..
Peanut butter	I	....	I	....	..	..	..	..	..
Tea	....	....	....	....	..	..	..	..	..
Butter	I II	....	....	....	I II	..	..	..	..
Malted milk	....	I II	....	....	..	..	..	..	..
Cocoa	I II	I II	....	I II	..	..	..	..	..
Salt	....	....	....	I II	..	..	..	..	..
Pepper	....	....	....	....	..	..	..	..	..
Dried apricots	....	II	....	II	..	II	..	..	..
Dates	....	II	....	II	..	II	II	..	..
Dried spinach	....	II	....	II	..	II	II	..	II
Lemon powder	....	I II	....	I II	..	..	I II	..	..
Dried milk	I II	I II	I II	I II	I II	I II	..	..	I II

* Vitamin E is omitted because we need so little and because it is so well distributed in common foods.

In order to insure a well-balanced diet, food experts have arranged a simple diet plan. This plan is in the form of a day's supply of food, but well-balanced meals can be planned from it. It is sometimes called the "protective diet" since it provides the food essentials that protect health. The diet plan includes:

MILK
One quart

MEAT, FISH, POULTRY
One serving

MEAT SUBSTITUTE—cheese, eggs, legumes, nuts
One serving

BUTTER
Three teaspoons

CEREAL AND CEREAL PRODUCTS
One serving whole-grain cereal
One or two servings whole-wheat bread

VEGETABLES
Two servings besides potato, one should be raw or a leafy vegetable

LEAFY, GREEN, AND YELLOW VEGETABLES

cabbage
lettuce
escarole
endive
other salad plants
spinach
Swiss chard
collards
dandelions
cress
water cress
mustard
Chinese cabbage
turnips and other greens
Brussels sprouts
kale
broccoli
fresh peas
canned peas
canned beans
globe artichoke
parsley
asparagus
peppers
carrots
squash
pumpkin
chives

FRUITS
Two servings. One should be orange or tomato

SWEETS

According to the desire for them and to maintain normal weight, after enough of the other foods are included to give adequate protein, vitamins, and minerals

If the weight remains normal, the amounts of the foods on the "protective diet" may be increased if desired. A person who is gaining weight and growing as he should, does not need to worry about calories. One who is fat, thin, or small for his age, should go to his doctor or a cooking teacher who can work out the problem of how many calories he needs. For example—for breakfast you decide to have an orange. According to the table an orange contains all the food elements except fat, protein, iodine, and vitamins D and E. So you might add bacon which, according to the chart, contains fat and protein, vitamins B and G. Your breakfast still lacks iron and iodine and vitamins D and E. So you add whole-wheat bread, a chief source of fuel, and milk for the extra vitamins, and because the food elements in milk are especially good for a growing boy or girl. Continue through three meals.

	Fats	Carbohydrates	Protein	Minerals					Vitamins					
				Copper	Calcium	Phosphorus	Iron	Iodine	A	B	C	D	E	G
Orange	..	x	..	x	x	x	x	..	x	x	x	..	..	x
Bacon	x	..	x	..	..	..	..	..	..	x	..	..	..	x
Bread (whole wheat)	..	x	..	x	x	x	x	..	..	x	..	..	..	x
Milk	x	x	x	..	x	x	x	..	x	x	..	..	..	x

Then check back and apply your general rules. Have you included everything listed on the "protective diet" and in the correct amounts? After you have done this several times, you will see that you must eat a variety of foods each day in order to get all the necessary food elements.

IMPORTANT SOURCES OF FOOD ESSENTIALS OTHER THAN WATER TO BE FOUND IN COMMON FOODS

	Fats	Carbohydrates	Protein	Minerals					Vitamins*				
				Calcium	Phosphorus	Iron	Copper	Iodine	A	B	C	D	G
Chicken	..	..	x	..	x	x	x	..	..	..	..	..	..
Beef	x	..	x	x	x	x	x	..	x	x	..	..	x
Liver	..	..	x	..	x	x	x	..	x	x	x	x	x
Bacon	x	..	x	..	..	..	..	..	..	x	..	..	x
Sea fish	..	..	x	x	x	x	x	x	x	..	..	x	..
Oysters	..	..	x	x	x	x	x	x	x	x	..	x	x
Bread, white	..	x	..	x	..	..	..	..	..	..	..	..	..
Bread, whole-wheat	..	x	..	x	x	..	..	..	x	x	..	..	x
Oatmeal	..	x	..	x	x	..	..	..	..	x	..	..	..
Cream of wheat	..	x	..	..	..	..	..	..	..	..	..	..	..
Chocolate	x	x	..	x	x	x	x	..	..	..	..	..	..
Sugar	..	x	..	..	..	..	..	..	..	..	..	..	..
Cheese, Cheddar	x	x	x	x	x	..	..	..	x	x	..	..	x
Cheese, cottage	..	x	x	x	x	..	..	..	..	x	..	..	..
Milk	x	x	x	x	x	..	..	..	x	x	..	..	x
Egg	x	..	x	x	x	x	x	..	x	x	..	x	x
Butter	x	..	..	..	..	..	..	..	x	..	..	x	..
Peanut butter	x	..	x	x	x	x	..	..	..	x	..	..	..
Molasses	..	x	..	x	..	x	x	..	..	..	..	..	..
Dried apricots	..	x	..	x	x	x	x	..	x	..	x	..	..
Peaches	..	x	..	x	x	x	x	..	x	..	..	..	..
Pineapple	..	x	..	x	x	..	..	..	..	x	x	..	..
Orange	..	x	..	x	x	x	x	..	x	x	x	..	x
Tomatoes	..	x	..	x	x	..	..	..	x	x	x	..	x
Spinach	..	x	..	x	x	x	x	..	x	x	x	..	x
Beets	..	x	..	x	x	x	x	..	..	..	..	..	x
Onions	..	x	..	x	x	..	..	..	..	x	x	..	x
Peas	..	x	x	x	x	x	x	..	x	x	x	..	..
Beans	..	x	x	x	x	x	x	..	x	x	..	..	..
Potatoes	..	x	x	x	..	..	..	..	..	x	x	..	x
Cod-liver oil	x	..	..	..	..	..	..	..	x	..	..	x	..
Nuts	x	..	x	x	x	x	x	..	..	..	..	..	..

* Vitamin E is omitted from the table because it is so well distributed in foods and because we need so little of it.

Vitamins	What They Are Especially Good For	Some Good Sources
A	Growth General health	Butter, cream, lettuce, fruits, whole milk, eggs, liver
B	Growth Prevents loss of appetite Prevents beriberi Keeps babies healthy	Milk, lettuce, yeast, oranges, carrots, eggs, whole cereals, liver
C	Teeth Prevents scurvy Growth	Fresh lemon or orange juice, apples, peas, tomatoes
D	Helps prevent rickets Develops strong teeth and bones Helps normal growth	Cod-liver oil, sunlight, butter, egg-yolk, liver, irradiated foods
G	Health and growth	Yeast, liver, wheat-germ, green vegetables

Minerals	What They Are Especially Good For	Some Good Sources
Calcium	Bones Teeth	Milk, cheese, green, leafy vegetables such as spinach and celery; carrots, oranges
Phosphorus	Bones Teeth	Milk, green vegetables such as cauliflower, asparagus; cottage cheese, oatmeal
Iron	Red blood cells	Lean beef, beef liver, oysters, peas, spinach, eggs
Iodine	Prevents goiter	Sea-foods of all kinds, some vegetables

Fresh Milk

In another way, too, Byrd was able to improve the diet on the second trip over the first trip. On the second trip he carried three Guernsey cows. "We believed," he said, "that we could get them through alive, and felt that fresh milk where there are no fresh things would add to the health of the men and be an asset in case of sickness." This was their only taste of fresh food, and during the long winter night the men craved sunshine and green vegetables. On the ship going down a bull calf was born to one of the cows. He was named Iceberg and he and two of the cows lived to be brought back to the United States.

★ How Your Governments Protect Your Food

Not until about 1900 did the United States Government give much attention to the inspection and regulation of foods. One reason why people did not think it necessary for the government to control food standards was that most of their food was grown and raised at home or near by. Few foods were transported long distances to be marketed.

As our industries became more specialized, as our cities grew larger, and as manufacturing increased, it became necessary to ship large quantities of food long distances.

About the year 1900 reports of unsanitary practices in the preparation of foods, particularly of meat, began to gain the attention of our people. These

stories caused a number of investigations to be started in the wholesale meat and other food and drug industries.

These investigations brought to light many unhealthful and unsanitary practices. This was especially true of the meat-packing industry with its great center, then as now, located in Chicago. Probably this dangerous condition existed because people knew less about the selection of meats than they did about the selection of other foods.

By Harold M. Lambert, Phila.

The best all-round food

Very soon the United States Government began passing a series of what are popularly called "Pure Food Acts." The purpose of these acts was to protect the consumer from the dangers of buying contaminated* foods. The government, besides requiring government inspection of foods, also set up certain standards for plants where foods were manufactured or prepared. For example, packaged goods containing foods, must be correctly labeled.

People who have communicable* diseases may not work in the meat-packing industry. They must also observe certain rules of personal hygiene to protect the consumer.

This interest on the part of our federal government was taken up by our other units of government. Today, every State, city, village, and almost every community, however small, has regulations covering the sale and distribution of food products.

Almost all dairies are examined by capable inspectors to insure your receiving healthful and sanitary milk. The weights and measures used by all who sell food products are regularly tested to make certain that you receive the correct amount for the money spent for your food. Most of the dairy cattle are tested for disease before their milk can be sold. Meat markets, food stores of all kinds, bakery shops, and restaurants are inspected and given ratings to show how well they meet the standards that are set up for such establishments.

In these ways our governments—national, State, and city—are trying to protect you from receiving foods that are unfit for human consumption. To insure a pure food supply it is necessary that every person should be careful in the selection of those foods that are likely to become contaminated and spoiled. Much remains to be done, both on our part in learning how to choose and buy foods, and also on the part of our lawmakers in making further rules and regulations governing the production and marketing of food products.

Do you Know?

Below are some questions. Study these questions and see if you can answer them. If you cannot answer any question, turn to the page number following the question and study that page. Then turn back to this page and see if you can answer all the questions.

1. Do you know why your meals should be well-balanced? (page 51)

2. Do you know foods that contain building materials for your body? (page 46)

3. Do you know which foods provide energy, heat, and power for your body? (page 46)

4. Do you know why it is important that your body should have proper mineral elements? (page 47)

5. What are the essentials of any diet? (page 46)

6. What do proteins do for your body? (page 46)

7. What foods are rich in proteins? (page 46)

8. What are the most important minerals found in foods? (page 47)

9. How many foods can you name that are rich in minerals? (page 47)

10. What foods contain much calcium and phosphorus? (page 47)

11. What foods contain much iron? (page 47)

12. Why do you need calcium and phosphorus? (page 47)

13. Why do you need iron and copper? (page 47)

14. Where is the "goiter belt"? (page 47)

15. What mineral in food is scarce in the "goiter belt"? (page 47)

16. What do vitamins do for your body? (page 48)

17. Name the vitamins. (page 48)

18. What general diet should you follow to include all the vitamins in your food? (page 48)

19. What element is found in the greatest proportion in all food that you eat? (page 48)

20. How much of your body is composed of water? (page 48)

21. What is a calorie? (page 50)

22. Do all foods have the same number of calories? (page 50)

23. Does your body need the same number of calories at all times? (page 51)

Things to Do

1. Write a list of foods rich in proteins.

2. Write a list of foods rich in fats.

3. Write a list of foods rich in carbohydrates.

4. Write a list of foods rich in calcium.

5. Write a list of foods rich in phosphorus.

6. Write a list of foods rich in iron.

7. Write a list of foods rich in iodine.

8. Planning meals: Ask your teacher if your class may organize itself into "food committees" to plan the meals for a family of two adults and two children, ages ten and twelve, for two days.

★ **9.** Find out how hams are cured and be ready to give a report to your classmates.

★ **10.** Make some posters showing good sources of proteins, fats, carbohydrates, calcium, phosphorus, iron, and iodine.

By H. Armstrong Roberts, Phila.

CHAPTER V

Taking Care

Lindbergh's Flight

In 1927 a young man named Charles Lindbergh landed an airplane on the flying field in Paris, France. He had flown from New York City to Paris! He was the first person to make this trip by airplane. Why do you think Lindbergh was successful in his attempt to fly from New York City to Paris?

In discussing Lindbergh's flight, one account says, "It wasn't Lady Luck that directed him in his lone flight over the ocean. It was merely a clock, a

compass, a collection of maps and charts, well-laid plans, and a mass of knowledge accumulated by long hours of study—these and his brave spirit carried him over the trackless wastes of the Atlantic to his destined spot on the Irish coast with a precision that was all but uncanny."

The success of such flights is thus said to depend largely upon preparation. Of course, even older boys and girls will not soon be making preparations for flying across the ocean, but the interesting thing is, that the same principles which make a flight successful can be used to make a hike, a picnic, a motor trip, a train trip, or boat trip, or even the adventure of everyday living successful.

Among boys and girls from five to fourteen years of age accidents cause nearly three times as many deaths as any single disease. Therefore it is important for boys and girls to be prepared to live safely. What are the preparations that will prevent accidents?

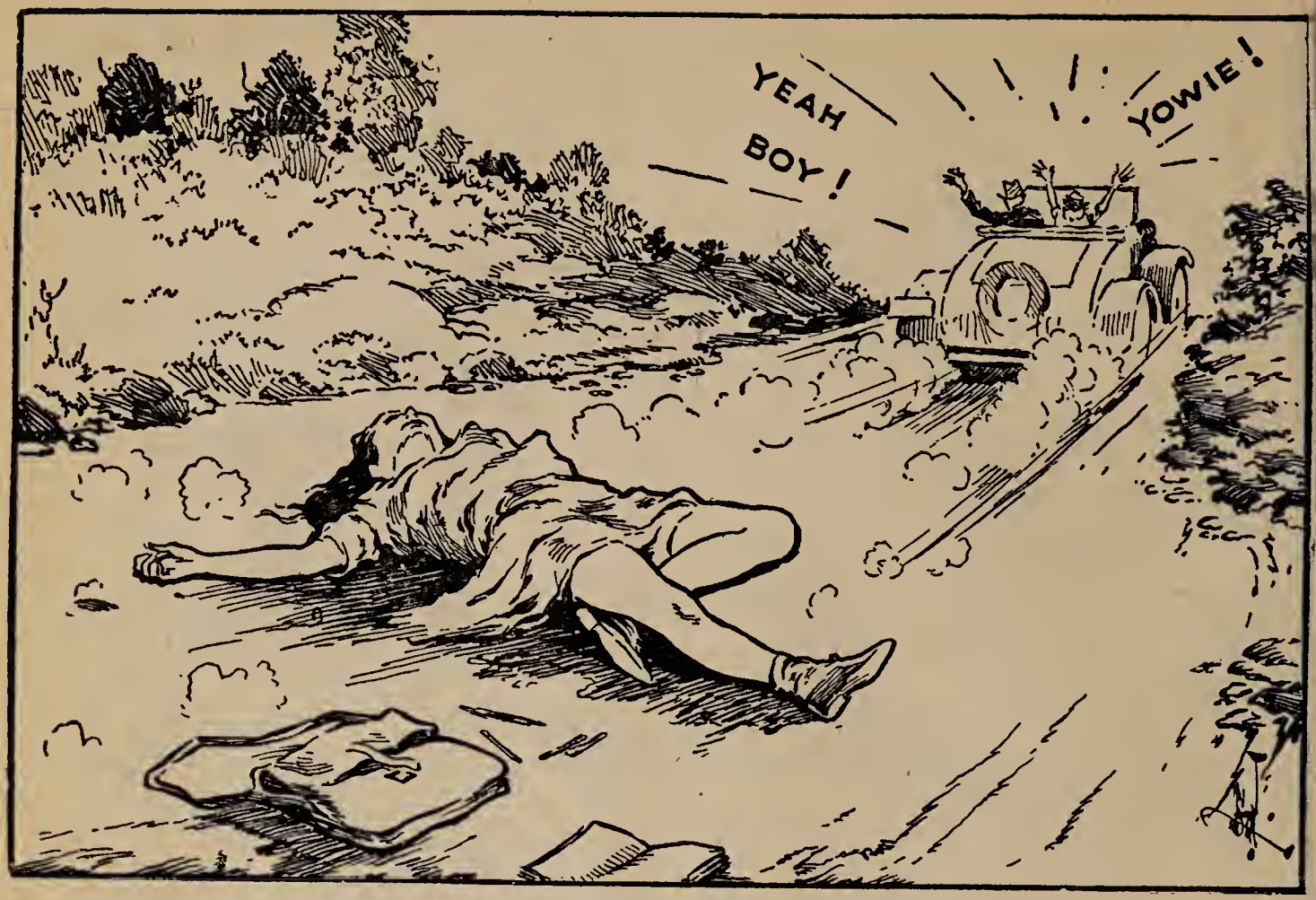
Experience

Every time a person crosses a street, uses a tool, bats a ball, or performs any other act in the right way he is building up a set of good habits. He is getting training and experience. Good form in getting on and off vehicles, playing games, using tools, carrying out a fire drill, building and caring for a campfire, handling a boat, swimming, walking along a country road, or climbing a tree means greater safety.

By Harold M. Lambert, Phila.

Traffic is not the only hazard in street football. The players are not properly uniformed, they may be physically unfit, and the hard surface is unsuited to falls.

It is wise to be very careful and to have someone show you the correct way to perform any act which you have not done before. There are more fatal accidents in sand-lot football than in regular football because boys playing their own game in vacant lots lack training and experience. Often they are physically unfit for strenuous exercise. Small children are inexperienced in handling hot water, medicine, and matches, and should, therefore, be protected against those hazards.



Just another drunken-driver accident

Physical Fitness

Physical fitness means well-developed muscles, good eyesight, good hearing, a body that has had good care. With such a body a person can see danger or hear it and be quick to avoid it.

Mental Fitness

Mental fitness means quick, accurate thinking and a healthy outlook on life. One who is mentally fit will not take unnecessary chances. He will use good judgment and not be a daredevil. He will understand that safety rules and warnings are made for his benefit and he will heed them. A show-off

who takes stairs two steps at a time and who does reckless stunts and pushes and jostles others is trying to call attention to himself. If he were mentally strong and well balanced, he would not feel this unhealthy desire to call attention to himself.

Colonel Lindbergh was mentally fit for his great flight. Here are some of the qualities possessed by Colonel Lindbergh. They were noted by Army officers who examined him for promotion. This report was made some time before he became famous. It says he was: Intelligent, industrious, energetic, dependable, purposeful, alert, quick of action, serious, deliberate, stable, efficient, frank, modest, congenial, a man of good moral habits and regular in all his business transactions.

Safety and Alcoholic Drinks

What effect do you think alcoholic drinks have on safety? Alcoholic drinks make one less mentally fit. Experiments have proved that a drink which contains alcohol may increase the time needed for a message to go to the brain and an answer to be returned to the muscles. Alcohol in the body may confuse these messages so that the muscles cannot act accurately and quickly. Drinking plus driving an automobile equals disaster.

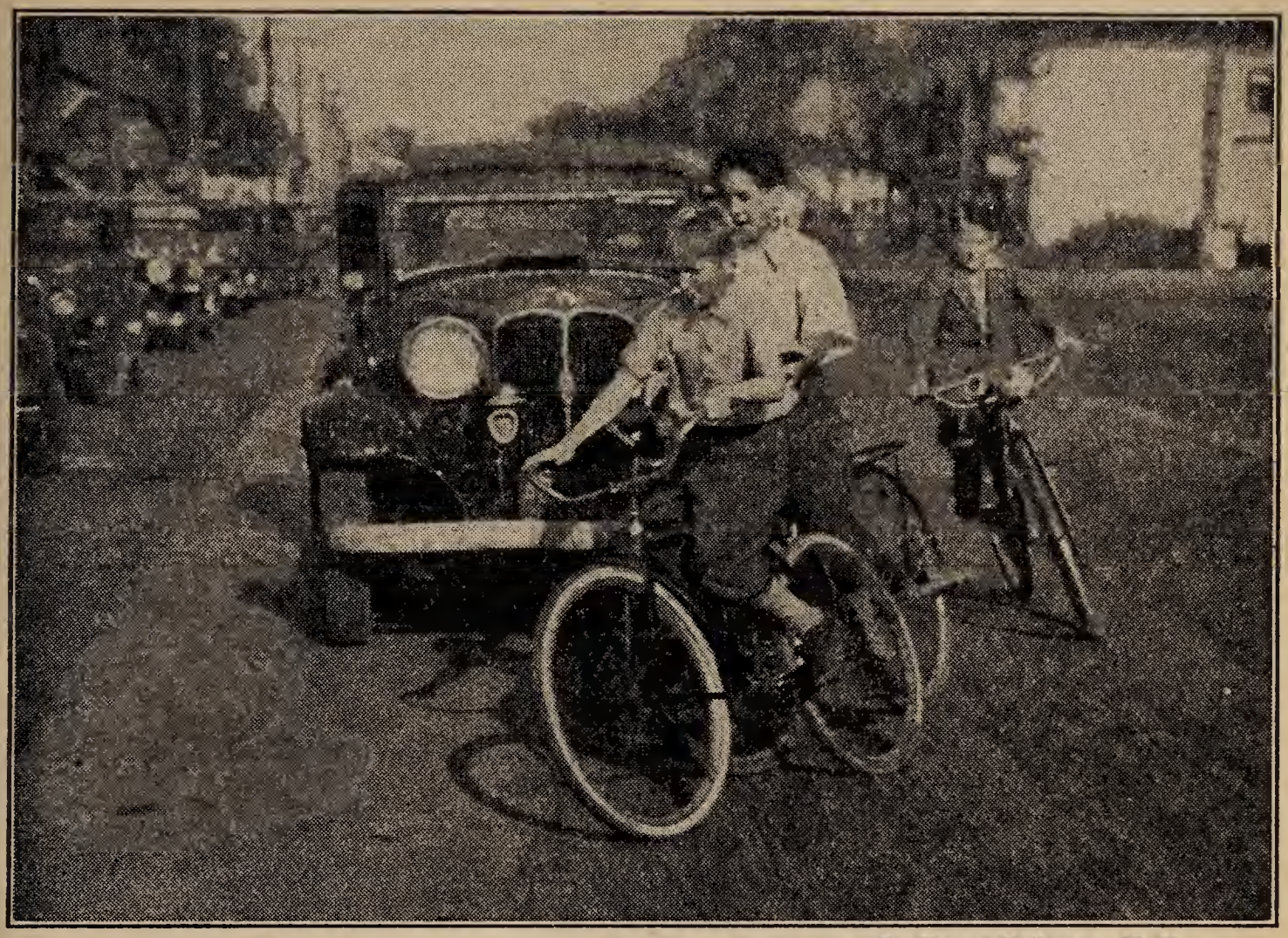
Dr. H. A. Heise analyzed 119 automobile accidents occurring in and around Uniontown, Pennsylvania and classified sixty per cent as "alcoholic accidents." Alcoholic accidents are those in which the person responsible for the accident has more

than two one hundredths of one per cent alcohol in his body fluids. Doctor Heise found that sixty per cent of the accidents and seventy-five per cent of the people injured or killed were in alcoholic accidents. He says there is a measurable loss of efficiency when as little as one ounce (six teaspoonfuls) of whisky has been consumed.

City and State reports of fatal motor vehicle accidents for a recent year, classify about five per cent of the drivers and seven or eight per cent of the pedestrians* as "intoxicated." If accidents could be more thoroughly investigated and there were some way to determine in every case the alcoholic content of the body as Doctor Heise did, these percentages would probably be found even higher.

Safety and Worry

Worry may also cause accidents. Freedom from worry will prevent accidents because a worried person cannot put his entire attention on what he is doing. If he is afraid he will be late to school he will take chances crossing streets. Worry may cause the muscles to tighten and not act together smoothly and naturally. Worry may cause one to do things hurriedly. Things done hurriedly cannot be done safely. Hurry causes accidents. Sometimes when one is in danger he has to decide what to do very quickly. For example, when riding a bicycle in traffic, a boy may be called upon to decide in a small fraction of a second whether to stop suddenly or turn to avoid a skidding automobile. He must



By Ewing Galloway, N. Y.

One must think quickly in traffic

consider the chances on both sides and make a decision all in less time than it takes to read this sentence. But to prevent an accident he must move calmly and accurately. A hurried or a worried person always finds it difficult to make a quick decision and to move accurately.

Fatigue and Accidents

Freedom from fatigue will prevent accidents. Well-planned experiments have been made in some factories to show that most accidents occur in the late afternoon when workers are tired. Fatigue also

plays an important part in automobile accidents. Between six and seven o'clock in the morning the number of motor accidents is lowest. It steadily increases all day until the largest number of motor accidents occur between five and six in the afternoon. Investigators say that fatigue is an important factor in this.

It is interesting to note in the accounts of Colonel Lindbergh's flight from New York to Paris that within a few hours before he expected to leave he lay down and went to sleep. He knew that one who is fatigued cannot weigh a question and make as careful a decision as one who is rested.

In the account of their flight from California to Australia two English flyers said, "We planned and plotted on a fixed policy of trusting for the best flying conditions and preparing for the very worst," and again, "We did not lightly regard the chances against us."

Do you recognize the chances against you?

Why Were John and Jane Injured?

John was tired from a long day's hike. Before going home he decided to climb a tree for the sport of it. A branch broke and John found it impossible to grasp another branch quickly enough to save himself from falling and breaking his arm.

Jane was going home at the end of the day. She stepped into the road. And because her mind was fatigued, she completely forgot to look out for cars. She was hit by a passing car and knocked

unconscious. Boys and girls often roller skate, ice skate, or play some game until they are so tired that their muscles will not act together to save them from a hard fall.

By H. Armstrong Roberts, Phila.

A tired person is more likely to be hurt

Some Common Accidents

Boys and girls should also hope for the best safety conditions but be prepared for the very worst. All of us are exposed to some common causes of accidents nearly every day. The tables on pages 70 and 72 show some common accidents which cause death.

You can see from Table 1 that in the 10–14 age group, motor vehicles, that is automobiles, trucks, buses, etc., caused most of the accidental deaths. In seventy-three per cent of these accidents the boys and girls were pedestrians. The next largest number of accidental deaths in this age group was from drowning. Firearms came third, falls fourth, and burns fifth in order. Those are just accidents which resulted in death. It has been estimated

TABLE 1

CAUSES OF ACCIDENTAL DEATHS IN A RECENT YEAR BY AGES

CAUSES	UNDER 5	5–9	10–14	15–19	20–24	ALL AGES
Motor vehicles	1,274	1,916	1,205	2,431	3,218	31,363
Falls	522	365	396	522	522	21,746
Burns	1,879	627	246	255	419	7,341
Drowning	641	595	914	1,045	795	7,465
Railroad accidents	45	75	131	340	387	3,973
Firearms accidents	88	210	402	496	425	3,026
Absorption of poison gas	33	16	16	38	72	1,668
All other causes	2,466	544	537	532	772	14,505

that for every accident causing death there are two hundred accidents which do not result in death but which cost money and cause suffering.

In Table 2 are listed the accidents that occurred to school children during one school year. Most of these accidents did not cause death. By studying the list of accidents to seventh graders it will be seen that most of the accidents to them occur in the school building and over half of these in the gymnasium and vocational* shops. Of the many accidents on the school grounds, most occur during games. The next largest number occur in the home. Most of the accidents at home involve falls. Among very young children, accidents in which burns occur are most frequent. Other accidents at home result in cuts, scratches, and scalds.

What can be done to reduce the number of accidents to school children? There is one fact that

gives us a hint of what to do. That fact is: While the total number of traffic deaths has been increasing each year, there are two groups which show a decrease. These groups are children from 5–14 and commercial vehicle drivers. Why do these groups show a decrease when all other groups show an increase in traffic deaths? It is probably because for the past few years schools and business firms have spent a great deal of time educating children and drivers to safety. It seems very probable, therefore, that accidents can be reduced if people will learn about how accidents occur and try hard enough to prevent them. Practice safety habits.

By Ewing Galloway, N. Y.

Watchfulness prevents accidents

The Cost of Accidents

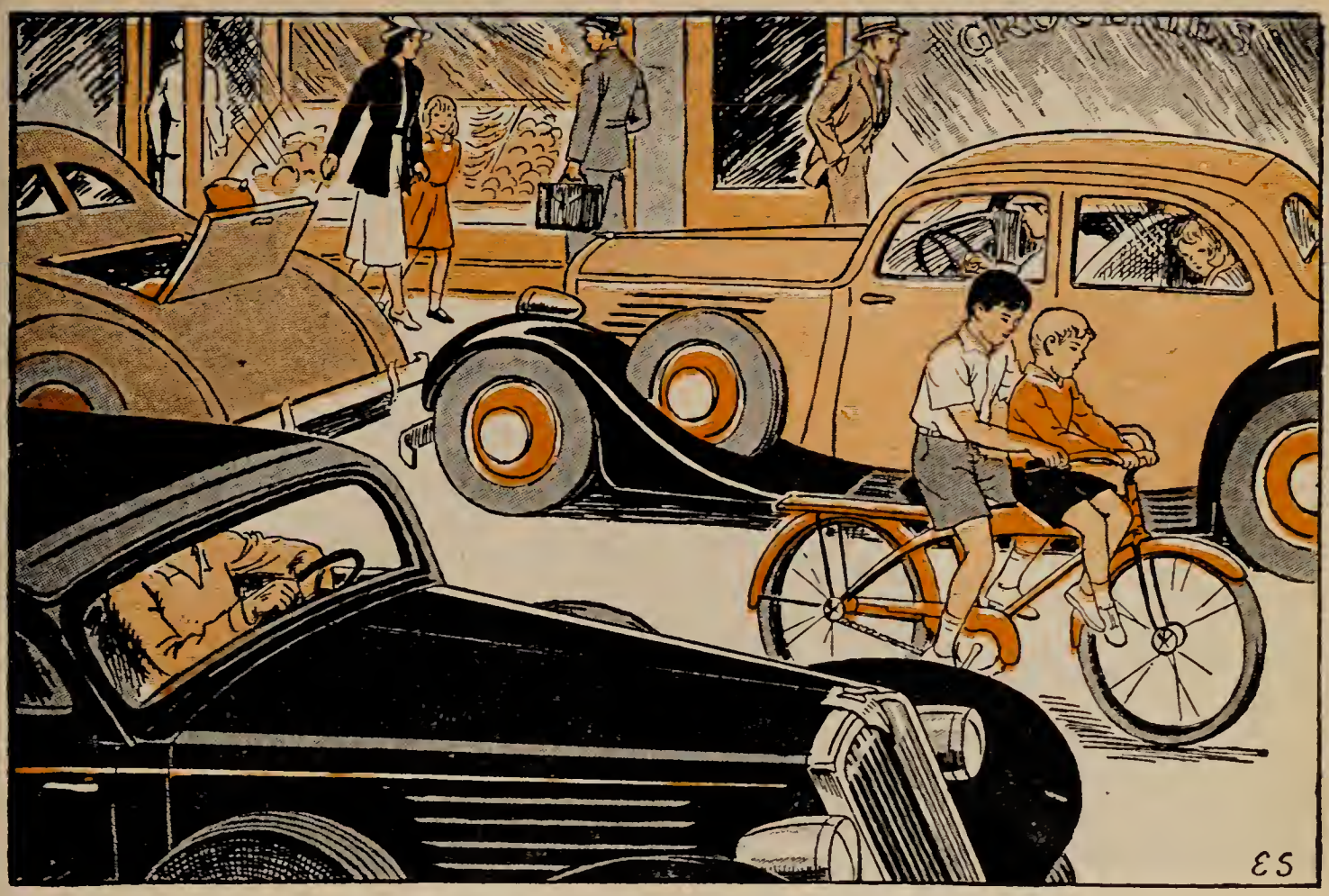
One of the reasons for reducing accidents is that they cost so much. When a person is injured or killed, he cannot earn money to support his family. There are big hospital bills. Often there is property

TABLE 2

ACCIDENTS TO SCHOOL CHILDREN BY TYPE AND GRADE

Classification	Students Killed and Injured, by Grades		
	7th Grade	8th Grade	9th Grade
Total	1,060	910	925
School Buildings	251	236	289
Classrooms and auditorium	28	25	31
Laboratories	...	...	1
Vocational shops	31	32	44
Domestic science department	6	9	8
Gymnasium	112	108	119
Swimming pool and showers	11	8	19
Dressing rooms and lockers	3	10	9
Toilets and wash rooms	4	1	...
Corridors	24	7	21
Stairs and stairways	20	26	28
Other building accidents	12	10	9
School Grounds	165	134	139
Apparatus—swings	1	...	1
Apparatus—slides	...	...	...
Apparatus—teeters	...	1	...
Apparatus—bars	5	2	...
Apparatus—other	9	...	4
Athletics—baseball	10	11	4
Athletics—football	23	23	50
Athletics—basketball	12	9	17
Athletics—soccer	5	13	14
Athletics—track	3	2	2
Athletics—other organized games	17	24	15
Other school-ground accidents	80	49	32
Going to and from School	106	62	58
Motor vehicle accidents	28	10	16
Other accidents	78	52	42
Home Accidents	236	219	163
Falls	122	107	72
Burns, scalds, explosions	18	16	9
Cuts and scratches	40	36	32
Other home accidents	56	60	50
Other Accidents	302	259	276
Motor vehicle accidents	63	41	55
Other accidents	239	218	221
Enrollment (in thousands)	50.3	46.2	52.6
Days lost (in thousands)	3.2	3.1	2.6

damage. The National Safety Council has tried to estimate how much accidents cost in a recent year. It amounted to this figure: $3,500,000,000. That much money represents about seventy per cent of



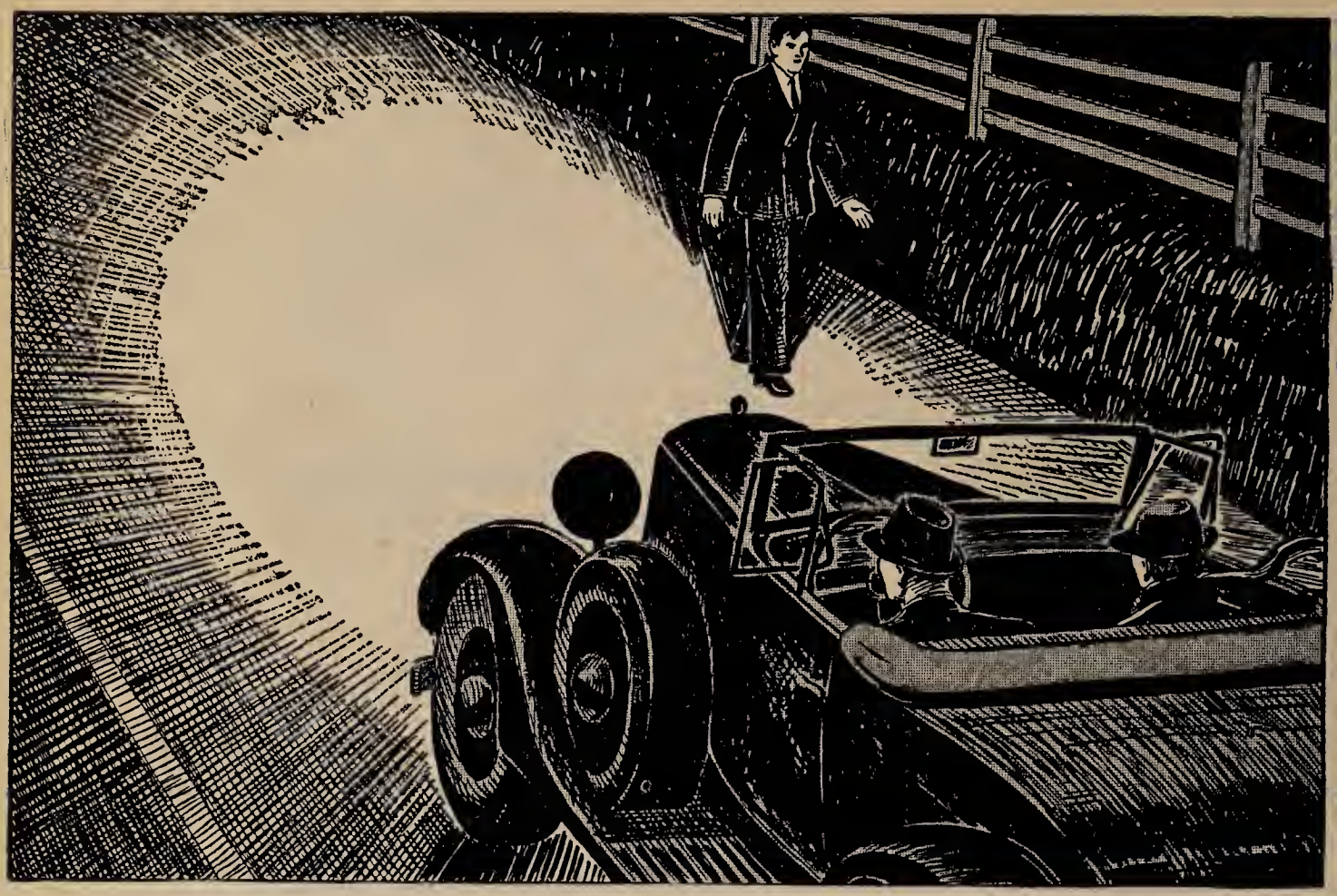
Taking a dangerous chance

what the United States spent that year for work relief. The work-relief fund looked like this: $4,880,000,000. Almost three fourths of the work-relief fund could have been paid with the money wasted on accidents!

Preventing Traffic Accidents

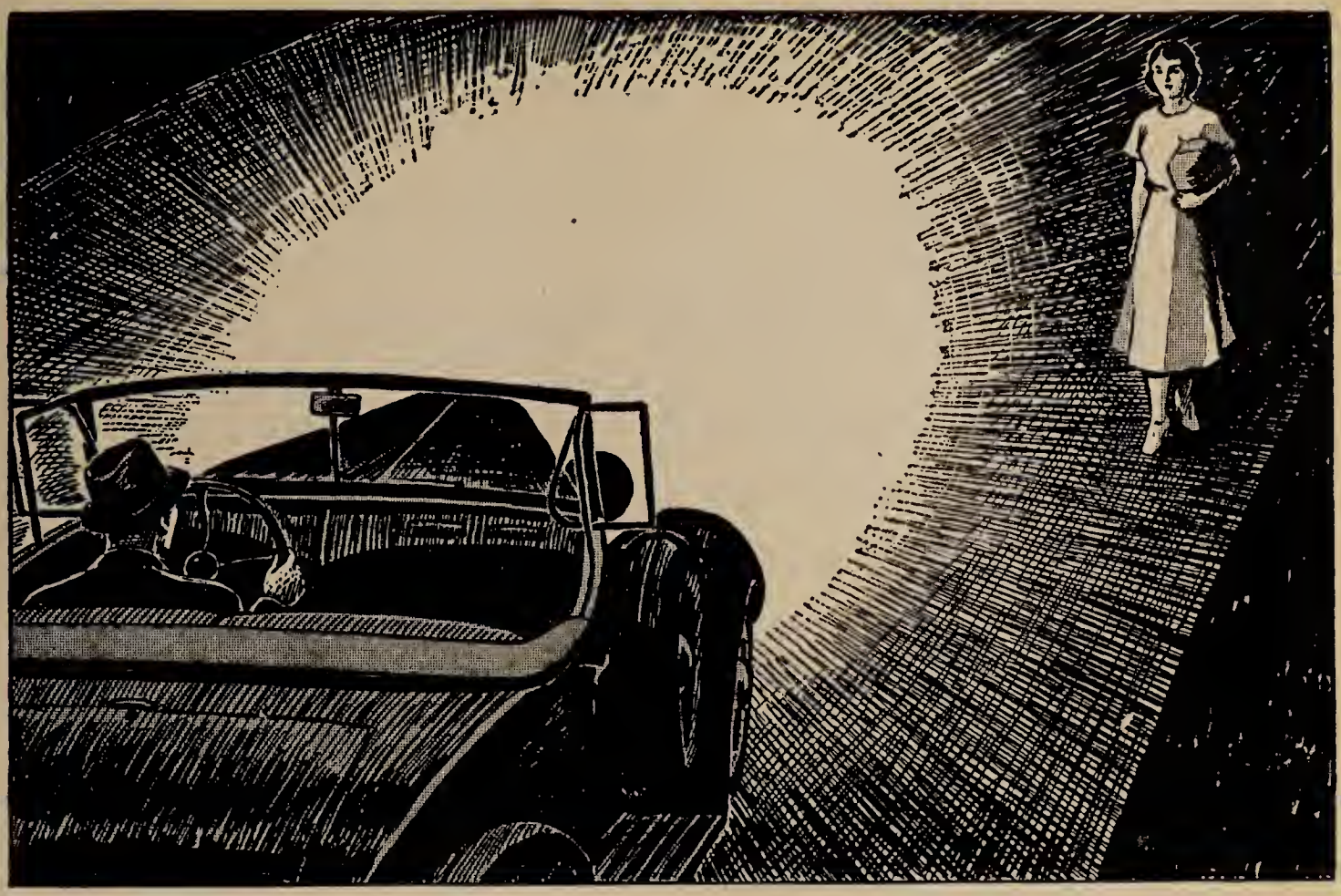
Here are some special rules for preventing traffic accidents:

1. Always be careful.
2. Cross streets safely.
3. Wait for signals.
4. Look right; look left.



It is hard for the driver to see at night

5. Assist younger children to cross streets safely.
6. Allow enough time so that you do not have to hurry.
7. Become familiar with traffic rules and laws.
8. Enter and leave a trolley or bus in a safe way.
9. Roller skate, coast, and play only in a safe place.
10. Do not cling to moving vehicles.
11. Do not hitch-hike.
12. Walk on the left side of a country highway.
13. Wear something white when walking on a road at night.
14. Never ride a bicycle after dusk.



If you wear something white it helps him

15. Never carry anyone on the bar or handlebars of a bicycle.

16. Never play in the street.

How to Avoid Drowning

1. Wait at least an hour after meals before you go in swimming.

2. Learn to swim well.

3. Have a swimming partner.

4. Dive only in deep water.

5. Do not make a practice of swimming where the water is over your head.

6. Always test the bottom of a strange body of water before wading or swimming there.

7. Get out of the water before you are fatigued.
8. Learn good form in handling a boat.
9. Be careful of heatstroke.
10. Make sure that ice is thick and safe before playing or skating on it.
11. Keep off the ice along a river's edge.

Avoiding Accidents with Firearms

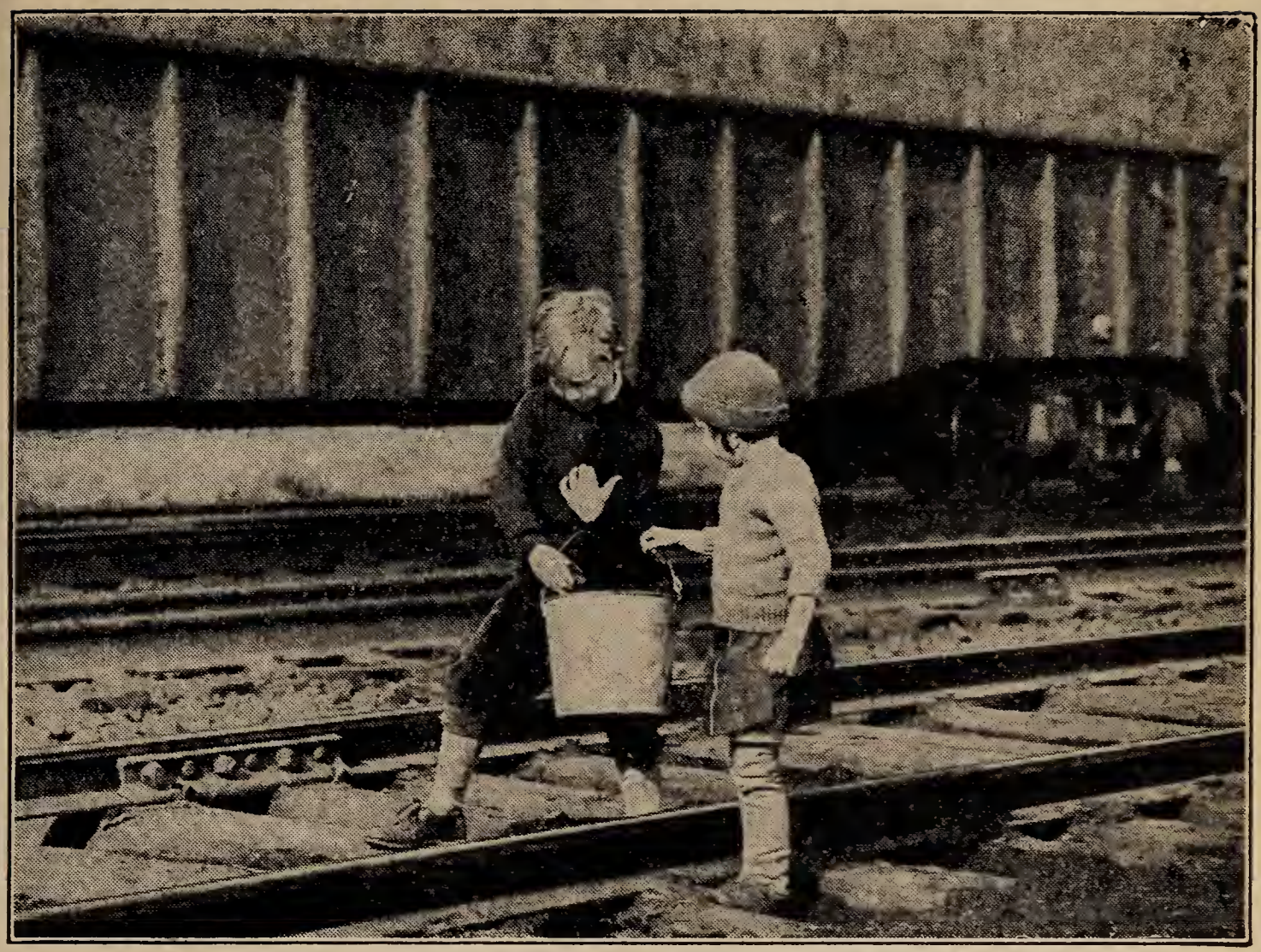
1. Never point a real or toy gun at anyone. "Unloaded guns," that is, guns which were thought to be unloaded, have killed many people.
2. Go hunting only with careful and experienced people.
3. Learn how to carry a gun and how to put one down with the least danger.

Avoiding Injury by Falls

1. Do not take chances.
2. Climb on safe places.
3. Stay away from buildings under construction.
4. Use a safe ladder.
5. Keep the house and yard picked up.
6. Be cautious on ice and other slippery surfaces.
7. Watch out for unprotected openings that may be stepped into.

Avoiding Fires

1. Never use inflammable* cleaning fluids, gasoline, benzine, naphtha.
2. Learn the correct way to use electric appliances.



By Harold M. Lambert, Phila.

The practice of gathering coal or playing around railroad tracks costs many lives

3. Keep papers, oily rags, and rubbish cleaned out of closets, attics, and cellars.

4. Be a good housekeeper.

5. Learn and observe the Scout rules regarding campfires.

6. Be careful in use of matches, fireworks.

Avoiding Railroad Accidents

1. Never play around railroad yards and tracks.

2. Cross railroad tracks cautiously.

Poison oak Poison ivy Poison sumac

Do not touch these

3. Never grab a moving train.
4. Do not pick up coal around a railroad track.

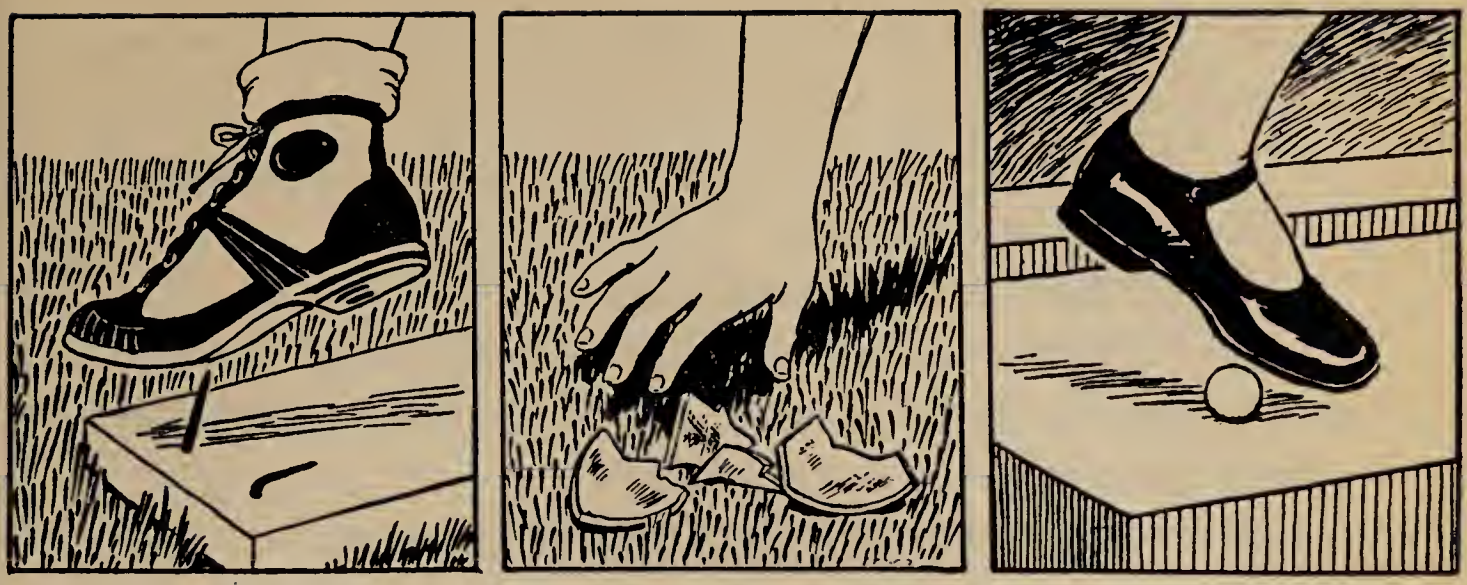
Avoiding Gas Poison

1. Never leave the motor running in the car with garage door shut.
2. Learn the correct way to light a gas stove and oven.
3. Take special precautions against flame being put out when something is left cooking on the gas stove.

Being Careful at Play

Many accidents occur in gymnasiums. To avoid accidents in gymnasiums and during games:

1. Players should be gradually conditioned to strenuous games and difficult gymnasium stunts.
2. They should learn good form in all athletic activities.
3. They should obey the rules of the game.



Avoid these accidents

4. A large number of rules in football and basketball prohibiting holding, striking, tripping, etc., are designed to safeguard the game. Learn these rules and play the game according to the rules.

5. All players should have regular physical examinations.

Some General Safety Rules

Here are some good general safety rules:

1. Avoid unnecessary risks.
2. Feel responsibility to help prevent accidents.
3. Understand what is meant by safety slogans.
4. Never indulge in practical jokes.
5. Listen carefully when someone explains the use of a new machine, tool, or other thing you use, as gas stoves, sewing machines, electric irons, power saws, joiners, grinders, insulators, hot implements.
6. Do not touch poison ivy and unknown fruits.
7. Learn to recognize and avoid harmful snakes.
8. Do not crowd, push, or trip others.

9. Develop skill in handling the body with ease and quickness in unexpected situations.

10. Avoid injuring anyone when throwing snowballs, sticks, and stones.

11. Do not sample medicines.

12. Protect younger children by seeing that poisons are properly labeled and stored so that even an adult must climb to reach them.

13. Use care when going up and down stairs.

14. Always remove nails, broken glass, and sharp objects to a safe place.

15. Learn the safe way to use tools, pocket knives, axes.

16. Be careful when opening tin cans, glass jars, and bottles.

17. Never let a child run around with a sharp lollipop stick or pencil.

18. When buying lollipops buy those with blunt or, preferably, flexible handles.

19. Be careful when carrying hot liquids.

Keeping an Accident Record

It is impossible to take figures for the entire United States and have them apply to every situation. Each boy and girl is most interested in the safety hazards in his particular community, in his home, and in his school. The only way to find out what these are is to study them as flyers study the chances against their safety, and prepare accordingly.

A complete record of every accident occurring to pupils in your school will make it possible to study

types and causes of accidents that occur in school. If these records are kept carefully, they may become very valuable to the class that keeps them and also to other classes attending the same school. As data begin to accumulate, charts and other studies can be made by pupils to help themselves. With complete records, it is easier to find out just where and how most of the accidents in a school occur. It is also easier to make effective plans for avoiding the same accidents. Safety regulations can be made and enforced. Safety is everyone's business.

Put poisons out of reach

The Two Kinds of Dangers

Dangers may be divided into two groups: (1) those that can be avoided, like accidents resulting from inflammable cleaning fluids, unsafe play places, thin ice, hanging on to moving vehicles; and (2) those that must be faced, like traffic dangers, stairways, slippery surfaces, dangers in games and sports. To guard against these latter kinds boys and girls must develop

skills and practices or habits that will protect them from the accidents that may occur. Almost any group of boys and girls could establish safe places for playing and coasting. An excellent safety slogan is found in the words of the Englishmen who flew safely without accident from Oakland, California, to Australia, "Equipped and safeguarded as far as it is humanly possible."

★ How the Navy Yards Take Care

Abraham Lincoln said: "It is the duty of every man to protect himself and those associated with him from accidents which may result in injury or death." Our government also recognizes this truth and is doing much to make us realize that carelessness is a great economic loss to the nation. To the individual it may mean needless physical suffering and the loss of wages during illness.

As a warning to all civil employees of navy yards and naval stations, the government has printed a booklet, "Navy Yards and Naval Stations." It is based on the experiences of many men in the accident-prevention field. From its 150 rules, the following have been taken. These rules are good ones for both boys and girls to observe.

"Employees are warned not to look around or engage in conversation while at work, as this is the cause of many injuries. 'Keep your mind on your work and your fingers on your hand.'

"Employees must not disregard warning signs, as to do so is to invite injury deliberately.

A little carelessness may cause blindness with possibly fatal consequences

"Employees are forbidden to take short cuts over dangerous places.

"Skylarking is an accident hazard. Do not expose yourself or fellow workmen to danger by such actions.

"In new construction or repairs the surrounding premises shall be kept as clean and orderly as possible. Boards with nails sticking up must not be left lying around. The nails should be turned down or drawn.

"When mixing acid and water, never pour water into acid, but pour *very slowly* acid into water.

"Employees must never stand on the head of a barrel to reach a higher object. If a barrel must be used, place a board across the top.

"Before lighting furnaces heated by gas or oil see that the draft dampers are open and valves closed tight, so that there will be no accumulation of gas or oil in the furnace; then proceed in the regular way to light the furnace.

"Employees should avoid spitting on the floors of workshops, as this is a dangerous menace to health.

"Employees are warned against wearing gloves, flowing neckties, or other loose or torn clothing around moving machinery, shafts, or pulleys. Many fatal accidents have been caused by failure to take these precautions.

"Employees must exercise care and judgment in handling live wires and electrical apparatus when the same is not out of circuit. Accidental contacts with high-tension circuits are invariably fatal.

"Exercise care in placing ladders before using them. Do not go up or down a ladder without the free use of both hands. If material is to be handled, use a rope.

"Order and cleanliness are important both from a safety and a fire-prevention standpoint. Many accidents and fires are caused by untidy conditions.

"When it is necessary to use a fire extinguisher of any design, direct the stream at the base of the flame where it will do the most good.

"Oily waste, rags, overalls, etc., should not be wrapped into a tight wad and thrown into a corner or lockers, as spontaneous combustion may occur from these materials.

"Do not use unsafe tools, such as hammers with broken or ill-fitted handles, mushroomed chisels, etc. They are dangerous.

"Employees must keep their machines clean and at the end of their turn leave them in this condition.

"All fires and lights should be kept away from any place where there is a possibility of inflammable gas escaping.

"Vigilance and watchfulness insure safety. Employees must not trust solely to the care exercised by another when their own safety is involved. When in doubt, take the safe course."

Things to Do

1. Write a list of some accidents in which you have been involved. Make a list of things you could have done to avoid these accidents.

2. Keep a record of traffic accidents reported in some newspaper for a week and classify them as to location and cause. Discuss in class how these accidents could have been avoided.

3. Keep a record of accidents in your school during one week. Discuss with your teacher and your classmates how these accidents could have been avoided.

4. Make a list of traffic rules for motorists, bicycle riders, and pedestrians. Be ready to explain the reason for each rule to your class.

5. Make a list of swimming rules. Be ready to explain the reason for each rule to your class.

6. Get a list of rules for baseball, basketball, or football. Pick out the ones which help to prevent accidents.

★ 7. Draw some safety posters.

★ 8. Join with some of your classmates in writing a safety play. Ask your teacher if you may give your safety play before your group.

What Do You Do?

Just to know what to do will not make you strong and healthy. To be strong and healthy you must do the things you know you should do. Here are some questions about what you do:

1. Do you have a dental examination twice a year?

2. Have you had a physical examination by a doctor this year?

3. Do you show loyalty to the plans made by the group to which you belong or are you selfish and only interested in the plans you make alone?

4. Do you weigh yourself frequently?

5. Have you recently compared your weight with charts that show the average weights for boys and girls of your age, height, and physical type?

6. Do you follow the advice of your doctor and dentist?

7. Have you been immunized against contagious diseases?

8. Do you put out the fire when you break camp?

9. Do you take precautions against avoiding possible accidents when camping or on a trip?

10. Do you try to "be on the safe side" in all your plans and actions?

11. Do you wear as heavy clothing when working or exercising in cold weather as you wear if you are not moving around?

12. What would you do for frostbite?

13. Do you knowingly take risks that you are aware may be dangerous to you or to others?

Put out fires when camping

14. Do you appreciate the generosity and the courtesy others show you?

15. Do you ever volunteer for work that you know you and others would not like to do?

16. Do you try to pattern your life after the good qualities of others about whom you have heard or read?

17. Do you have a friendly attitude toward the people with whom you come in contact?

18. Through exercise, work, and sports are you developing your body efficiently?

19. Do you follow a program of exercise that will give you a better posture?

20. Do you pay attention to what you are doing and to what is going on around you?

21. Do you enjoy both working and playing?

22. Do you vary your diet in accordance with the type of work you are doing?

23. Do you eat foods which furnish the body with sufficient mineral elements?

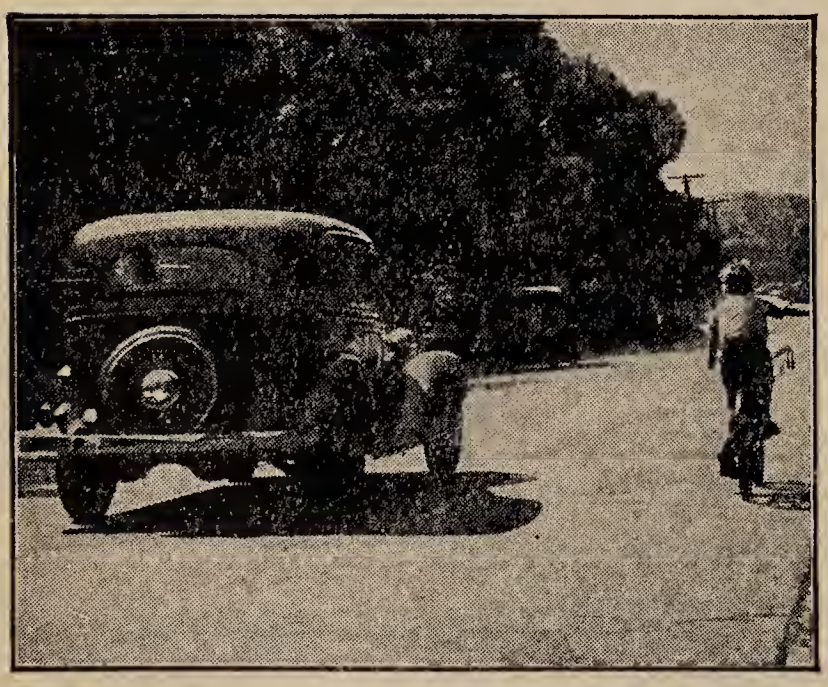
24. Do you drink at least five glasses of water each day?

25. Do you have milk in some form every day?

26. Do you look both ways before you cross a street or highway?

27. Do you observe the same kind of safe driving habits in riding your bicycle that good automobile drivers follow?

28. Do you co-operate with your teachers and fellow pupils in your school fire drills?



By Ralph M. Bair, Phila.

Observe safe driving habits on your bicycle

29. Do you go swimming in water too deep for you?

30. Do you play rough games without the supervision of a qualified playground director?

31. Do you go boating without having an older person who knows something about boats with you?

32. Do you carry matches with you?

33. Do you try to "show off" before your friends by doing reckless stunts?

34. Do you allow yourself plenty of time in getting to the places you are going?

35. Do you help younger children to cross streets safely?

36. Do you stop playing before you become fatigued?

37. Do you always wait at least an hour after eating before going swimming?

CHAPTER VI

First Aid

Common Injuries

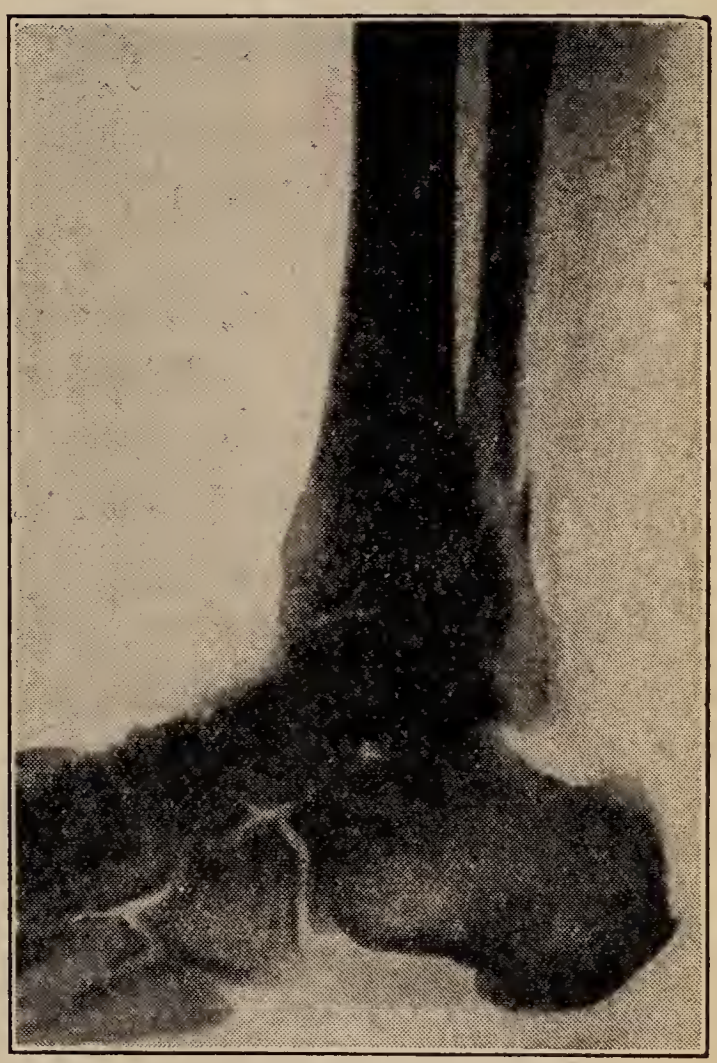
Sometimes one must treat an injury at once. If a person is injured at all badly, the first thing to do is to call a doctor, but there are certain things that can be done as first-aid treatment before the doctor arrives. The most common injuries are bruises, sprains, dislocations, broken bones, cuts and scratches, burns from fire, burns from acids or alkalies, scalds, sunstroke, heat exhaustion, frostbite, electric shock, gas poisoning, injuries resulting in unconsciousness, poisoning from snake bites, poisoning from plants such as poison ivy, poisons that have been swallowed.

First Aid to Bruises, Sprains, and Fractures

A bump which does not break the skin is called a *bruise.* If a bruise interferes with the circulation of the blood it will probably cause a black-and-blue spot on the skin. If a person has received a bad bruise, a piece of ice or a cloth wet in very cold water should be applied immediately to the bruise and this treatment continued for a considerable time. If the skin has already turned dark, hot water instead of cold water should be used.

Sometimes the ligaments* and muscles are stretched beyond their natural length and out of their natural position. This is called a *sprain.* A sprain is often more painful than a fracture (a broken bone). A person with a bad sprain should not be allowed to use the sprained part of his body until a physician has seen it. Hot compresses* may relieve the pain of a sprain. A physician can usually bandage a sprain so that it will feel more comfortable.

A broken bone is called a *fracture.* In case of a fracture a doctor should be consulted as soon as is



By Ewing Galloway, N. Y.

X ray of fractured leg

By Ewing Galloway, N. Y.

X ray of fractured arm

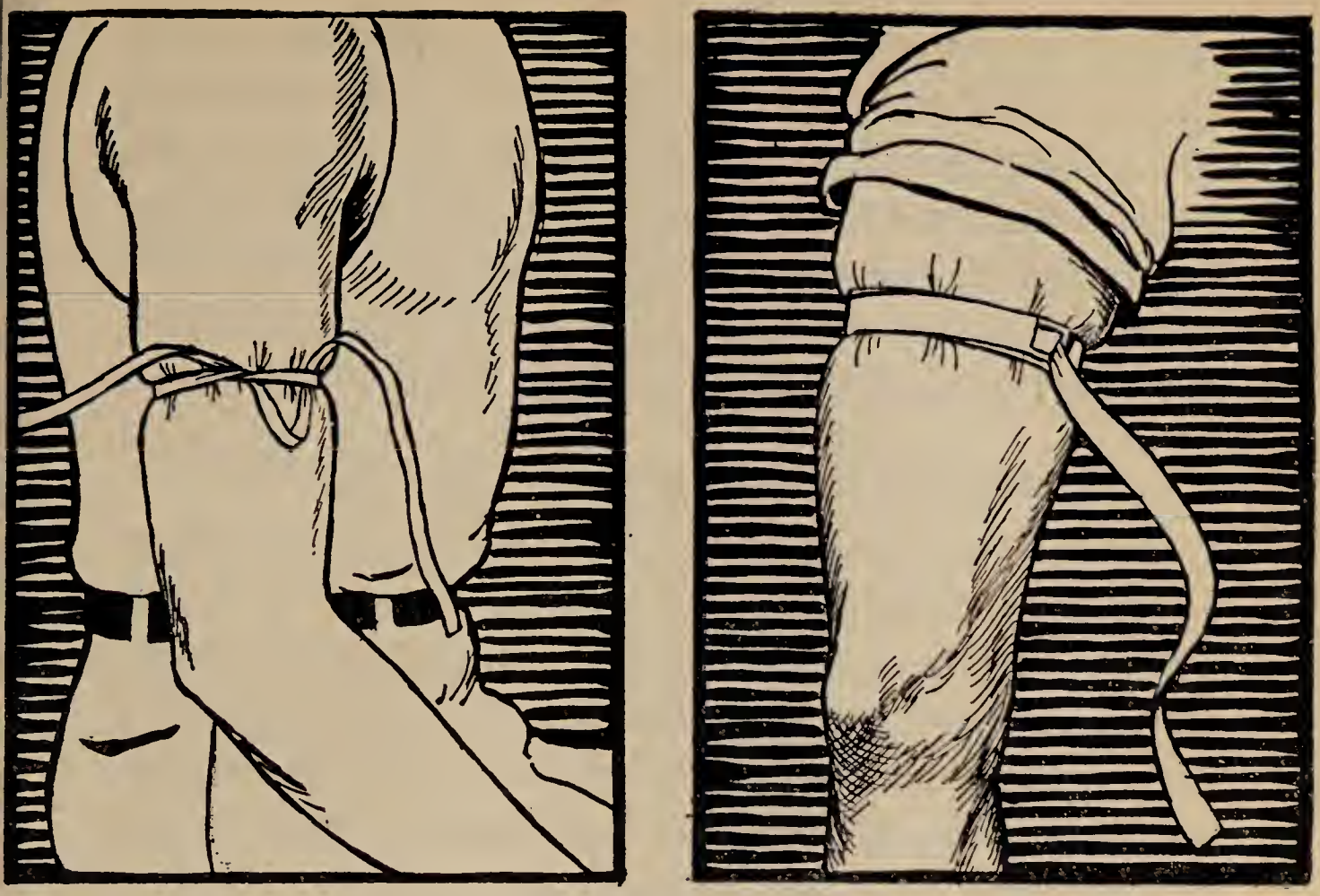
possible. If a person has a broken leg, he by no means should be allowed to try to walk upon it. If he has a broken arm, the arm should be supported when he is moved. It is usually better for a person with a broken bone not to be moved unless the broken bone is supported with something stiff, called a *splint*.

People in automobile accidents often injure their backs. Such people should not be moved until a doctor has had an opportunity to examine them, for movement may complete the fracture of the spine and cause death.

Treating Cuts and Scratches

If you were with someone who cut his arm or leg, would you know whether an artery had been cut? If an artery is cut, the blood is bright red and it spurts out every time the heart beats. When a vein is cut the blood flows out steadily, and it is a darker red than when an artery is cut.

Would you know what to do if someone cut an artery in his arm or leg? After a person has been cut, it is well to let some blood flow out to wash dirt out of the wound. To stop the bleeding hold a piece of sterile* cloth against the wound. If that does not stop the blood, you should apply a tourniquet* on



A tourniquet stops bleeding

the leg or arm. To do this take a strip of cloth or a handkerchief and tie it around arm or leg between the cut and the heart. Try to have the knot directly over the blood vessel which has been cut. Put a stick under the cloth and then twist the stick to tighten the cloth. The pressure will squeeze the artery together. About every fifteen minutes the tourniquet should be loosened to allow a little blood to flow to the cells in the injured arm or leg. If this is not done the cells will die from lack of oxygen and that part of the body may be seriously harmed. When the bleeding has stopped, clean the skin around the wound and then put on some antiseptic* and a sterile bandage.

One of the chief dangers from scratches is that serious infections may start in them. The larger and deeper the scratch the greater is the danger, for more surface is exposed to germs. In giving first aid for scratches, one should wash them thoroughly with pure soap and clean water. Some soothing antiseptic may also be applied, and a sterile bandage.

Giving First Aid for Burns and Scalds

Burns often occur in one of two ways: first from fire, second from acids. In case a person is burned by fire, the best thing to do is to put compresses* of tea over the burn. After a few compresses have been applied, a compress should be bandaged over the burn and kept moistened with tea. Care should be taken not to make the bandage too tight. In case of a bad burn a doctor should be called immediately.

If a person has been burned by acid, the best thing to do is first to wash thoroughly with lots of water and then apply limewater, baking soda, or good clean soap. For some alkali burns, such as those from lye, lime, or ammonia, vinegar and lemon juice are the best materials to apply. Alkali burns should also be flushed with water before any other treatment is used.

Scalds are burns from hot liquids or steam. Scalds should be treated in the same way as other burns.

Sunstroke and Heat Exhaustion

Both sunstroke and heat exhaustion occur on very hot days, but they affect a person very differently.

Sunstroke makes one's face very red, while heat exhaustion makes a person's face very pale. Both sunstroke and heat exhaustion make one feel queer and faint but they should be treated very differently.

A person affected by sunstroke should sit in the shade with cold cloths or ice on his head. He should be very still for some time after he has been affected by sunstroke.

If a person has been stricken by heat exhaustion he should lie down in a warm place. He should have hot water bottles, and blankets should be wrapped around him until his face is of a natural color. A person suffering from heat exhaustion should likewise be sure to rest for some time after he has been affected.

Sunburn

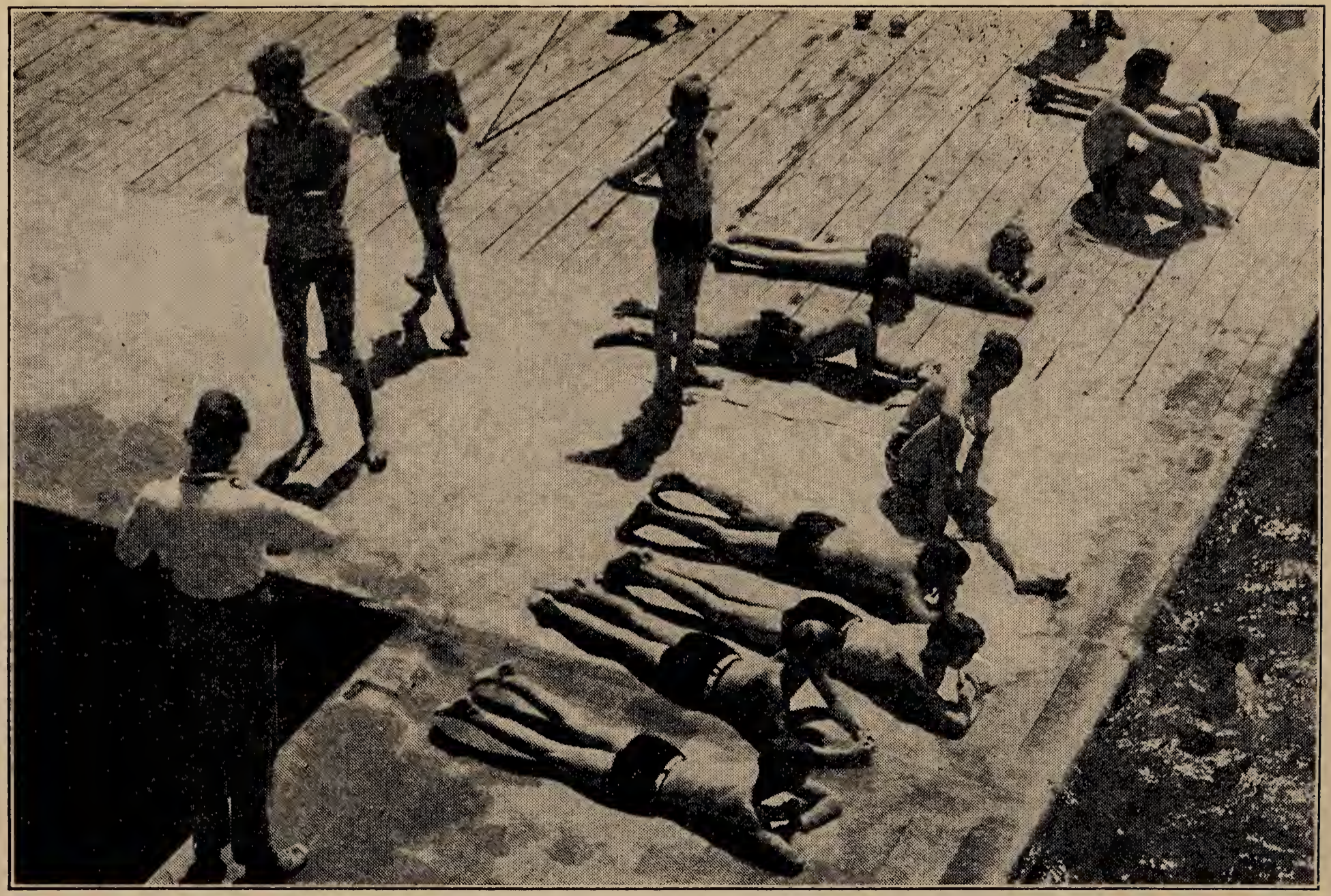
Sunburn results from being exposed to the sun too much before your skin has been hardened to it. A bad sunburn is like any other burn. It is very painful and should be treated like a burn from fire. If blisters form, be very careful of infection.

Frostbite

Frostbite is a condition in which part of one's body, such as one's nose or ear, has been frozen. Frostbite should be treated by brisk rubbing to bring back the circulation. Never apply heat to frostbite.

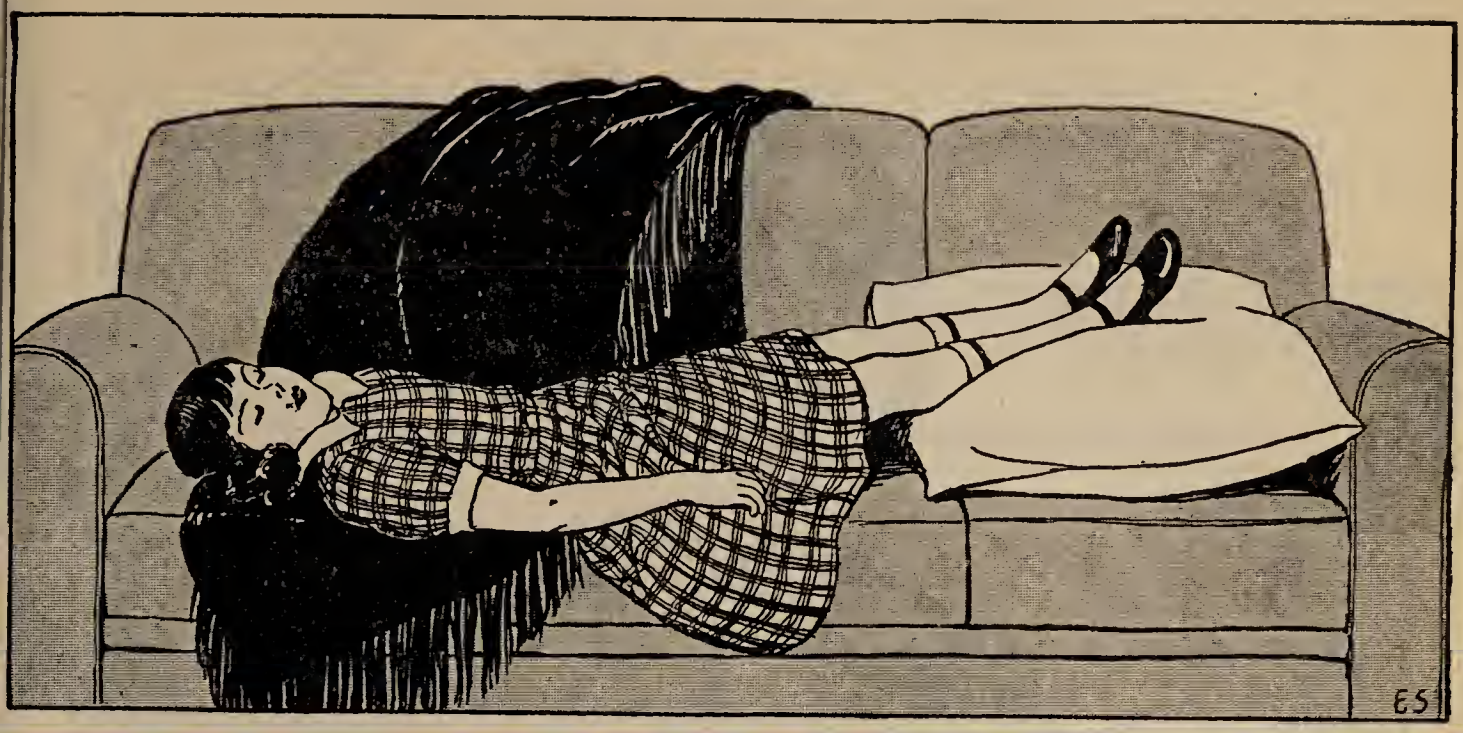
First Aid for Unconsciousness

Sometimes fear, severe injury, standing for a long time in one position, or some other cause will prevent



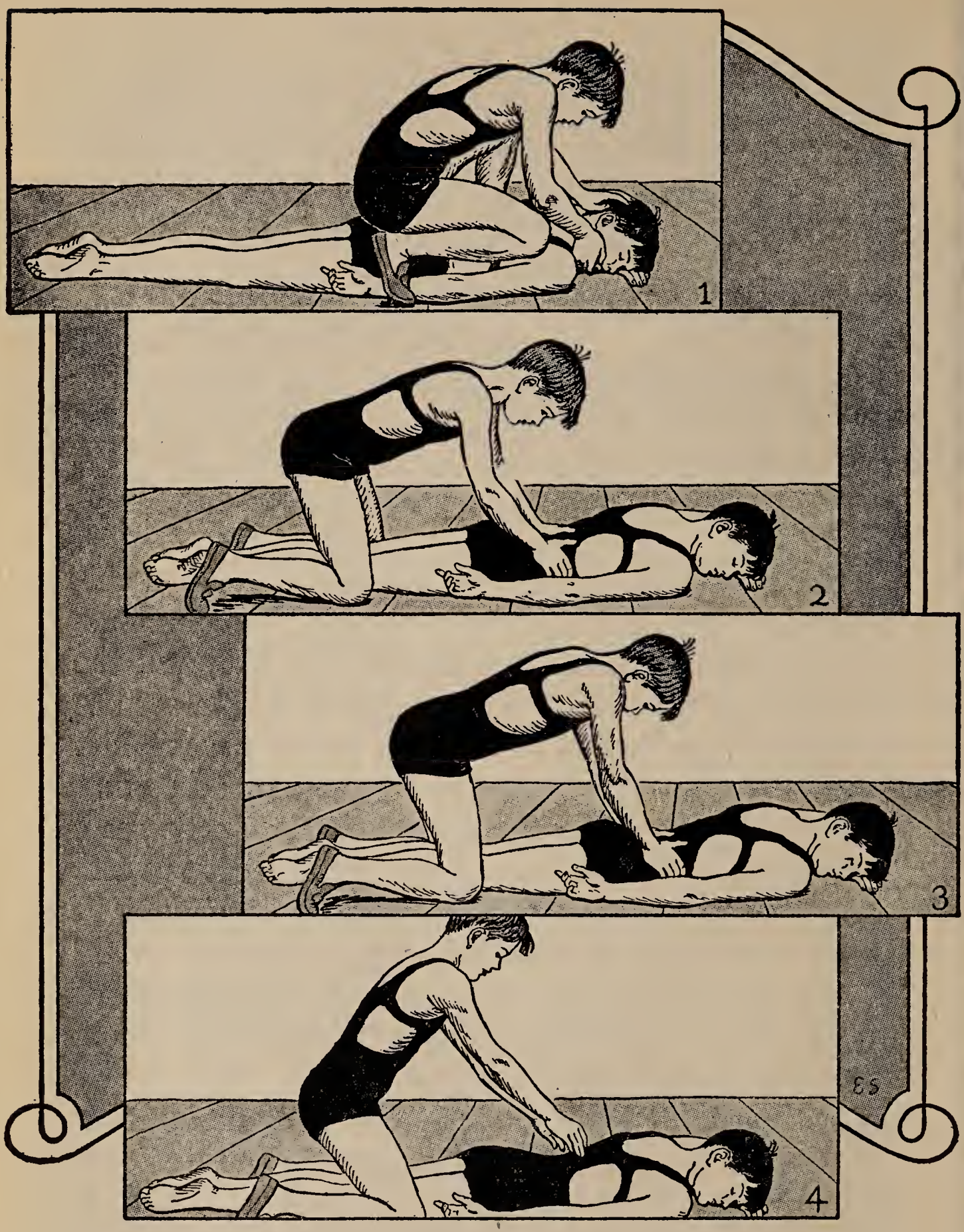
By H. Armstrong Roberts, Phila.

Sunburn is very painful and may be dangerous



Place a fainting person's head low

enough blood from flowing to the brain. When this happens a person feels faint and may lose consciousness. The face and lips may become pale and the person may fall over. When a person has fainted or is unconscious, the best thing to do is to have him lie down or hold his head low to allow blood to flow more freely to the head. No pillow should be used, and sometimes the feet may be slightly raised. Sometimes when a person feels faint he should lie down or hold his head low to prevent fainting. Cold cloths may be placed on the head of a person who is unconscious. Do not attempt to make an unconscious person drink anything, or he may choke. Sometimes a little aromatic spirits of ammonia on a cloth or handkerchief held under the nose of the unconscious person will bring him back to consciousness. Fainting is the result of too little blood flowing to the brain. After a person who has fainted



1. Turn head to side; 2. Put hands over short ribs; 3. Press down while counting three; 4. Release pressure and count three

has regained consciousness, stimulants, such as a cup of hot tea or a cup of hot coffee, are helpful.

Unconsciousness due to drowning or gas poisoning should be treated by wrapping the injured person in warm blankets and, if possible, applying hot water bottles. Artificial respiration, such as is shown on page 98, should be given at once.

First Aid When Poison Has Been Swallowed

Sometimes a person, particularly a child, may swallow medicine which is poisonous. Poisons which have been swallowed are of two types—acids and alkalies. When a person has swallowed alkalies, such as lye, lime, or ammonia, he should be given mild acids such as juice of lemons or oranges. In case a person has swallowed strong acids, such as hydrochloric or sulphuric acid, he should be given such things as baking soda, or limewater. In any case of poisoning it is well to give the person who has swallowed the poison a dose of any kind of oil, such as olive oil, castor oil, cod-liver oil, or milk or whites of eggs. If a person has swallowed corrosive* alkalies or acids do not try to get him to vomit.

If a person has swallowed some poison other than strong alkalies or acids he should be made to vomit. Something which will cause vomiting is called an *emetic*. About a teaspoonful of mustard mixed in a glass of warm water makes a good emetic. About a tablespoonful of salt mixed in a glass of warm water makes a good emetic. If neither mustard nor salt is available, drinking warm water alone will often

induce vomiting. Vomiting may also be induced by putting a finger down the throat of the person.

Anything which offsets the effect of a poison is called an *antidote.* Below is a list of some common poisons and their antidotes.

Poison	Treatment		
Acids			
Hydrochloric	Whites of eggs	.....	Strong limewater, baking soda, magnesia, soap, or plaster from walls
Sulphuric			
Nitric			
Alkalies			
Lye	Whites of eggs	.....	Vinegar, lemon juice, orange juice, milk
Lime			
Ammonia			
Alcohol			
Whisky	Whites of eggs	Emetic	Strong coffee, water
Toilet waters			
Bay Rum			
Camphor			
Napthaline	Whites of eggs	Emetic	Strong coffee, warmth
Flake Camphor			
Camphor Balls			
Carbolic acid	Whites of eggs	.....	Epsom salts, whisky, water
Carbona	Whites of eggs	Emetic	Strong coffee, whisky
Gasoline	Whites of eggs	Emetic	Strong coffee
Iodine	Whites of eggs	.....	Cornstarch and water or milk
Lead poisoning			
Paint	Whites of eggs	Emetic	Epsom salts
Soothing syrup			
Morphine	.....	Emetic	Strong coffee, keep awake, artificial respiration
Tobacco	.....	.....	Strong coffee
Turpentine	Whites of eggs	Emetic	Strong coffee, lots of water, keep awake

Snake Bites

When a poisonous snake bites a person, poison is injected into the body. In applying first aid to snake bites, the first thing to do is to make deep cuts with a sterile instrument where the snake fangs have entered the body. As much blood as possible should be sucked from the wounds and spit out. The rescuer must have no cuts or sores in his mouth or on his lips when he does this, or he, too, will take the poison into his blood stream. Much of the poison from the snake can be drawn out of the wound in this way. If the poison enters the blood vessels it may be carried throughout the body. To prevent this a tourniquet should be applied between the snake bite and the heart just as in the case of a serious cut. Do not be alarmed by a snake bite. Walk—don't run—for help, for running would cause the poison to spread faster. Few snake bites in the United States cause death. Many people suffer more from fright than from poison after they have been bitten by a snake. It is important to keep calm and apply correct treatment in case of snake bite.

Poison from Plants

The most common causes of poisoning from plants are poisoning from poison ivy, poison oak, and poison sumac. If a person has been poisoned by poison ivy, poison oak, or poison sumac, the affected skin should be washed with laundry soap. Care should be taken to avoid scratching the exposed areas

of skin. A person who has been poisoned by poison ivy, poison oak, or poison sumac should also rest and take very little exercise.

Remember to Call the Doctor

In case of a bad injury do not think that first aid is sufficient treatment. The most important thing to remember in case of a bad accident is to call a doctor and report the accident to him. When you call a doctor about an accident, be sure to tell him what kind of accident it is so that he can bring the right instruments, materials, and medicines with him. First-aid treatment is usually all right in cases of small home accidents, but in cases of serious accidents the advice and services of a physician are essential.

★Anesthesia—Surgery's Ally

For centuries surgeons have tried to relieve patients of pain during operations. The Bible and the literature of the Chinese, Egyptians, Greeks, and Romans contain numerous references to artificial sleep. Many different methods have been employed during the centuries to produce artificial sleep. There are the weird incantations of savages. South America's Indians dulled the pain of an operation by having the patient chew coca leaves with lime, which was a crude method of extracting the numbing drug cocaine. In olden days alcohol was given as a narcotic to patients just before operations. The

Romans produced numbness in a given part of the body by a process of freezing.

The three anesthetics which were first discovered, and which are still widely used, are oxygen and laughing gas discovered in 1772; chloroform discovered in 1831; and ether discovered in the thirteenth century but first used officially in surgery in 1846.

In 1844 Dr. Horace Wells, a dentist of Hartford, Connecticut, used laughing gas successfully in the extraction of a tooth. His attempt to make a public demonstration of his discovery failed, but he continued to use laughing gas in his private practice.

Dr. Crawford W. Long of Jefferson, Georgia, first used ether to prevent pain in a surgical operation on March 30, 1842, when he gave a patient ether to inhale and then removed a small neck tumor. The operation was successful, but Doctor Long failed to make his discovery known to the public, therefore he is not generally credited with having been the first to perform an operation with the patient under general anesthesia.*

The first successful public demonstration of the use of anesthesia took place in an old-fashioned room at the Massachusetts General Hospital, Boston, on October 16, 1846. On that day Dr. William T. G. Morton of Charlton, Massachusetts, a dental and medical student, entered the operating room where a group of students of the Harvard Medical School was assembled. He took from his bag a globe-shaped glass device attached to a breathing tube into which

he poured a few drops of a sweet-smelling fluid called *ether*. He inserted the tube into the mouth of the patient on the operating table, who soon fell into a quiet sleep. The attending physician, Dr. J. Collins Warren, proceeded at once to remove a leg tumor from the patient. The operation was successful.

Dr. Oliver Wendell Holmes, beloved poet and essayist, at that time Professor of Anatomy and Physiology at the Harvard Medical School, adopted the term anesthesia from the Greek to describe the process. It means "insensibility." The word *anesthesia* has since been used to mean unconsciousness of or insensibility to pain.

With minor changes, the little operating room where anesthesia was first used has been preserved as a museum of anesthesia. Doctor Morton was the first physician to be given a place in the Hall of Fame in Washington, D. C., and Doctor Long's memory is perpetuated by a statue in the Hall of Statuary in the nation's capitol.

Ether is still a favorite anesthetic of surgeons. However, the method of administering ether has been much improved since Doctor Morton's first use of it.

When Doctor Holmes used the word *anesthesia* he knew of only two kinds, ether and laughing gas. Today there are over two hundred kinds of anesthetics, including sleeping potions, nerve quieters, and local and general anesthetics, without which aid modern surgery could not have advanced to its high state of efficiency.

Things to Do

1. Make a list of some of the most common injuries. Be ready to tell how to treat these injuries.

2. Make a list of injuries that you have had. Be ready to tell how your injuries were treated.

3. Be able to tell your class how to know whether a person has a sunstroke or heat exhaustion and what to do in each case.

4. Be ready to tell your class what to do if a person is unconscious.

5. Illustrate artificial respiration on some member of your class.

6. Make an inspection of your home to find out if everything that is poisonous or that contains poison is clearly marked "Danger—Poison." If it isn't marked, put a sign on it but be very careful when you are doing it so that you do not get hurt.

7. Be able to tell your class when first aid should be given and when it should not be given.

8. Be able to tell your class why it is always important to call a doctor the first thing when there is a bad accident?

★ **9.** Write a short story about what the doctor did when you were injured.

★ **10.** Write a play about a "make-believe" accident in which someone breaks his arm, and tell what is done to help him. Ask your teacher if you may act the play.

Courtesy, Miss Kay Francis and Warner Brothers

CHAPTER VII

The Lady with the Lamp

Cap's Accident

Down an English country lane came two people on horseback. One was an unusually attractive young girl. She rode sidesaddle, as was the custom in those days, and she rode well. Her name was Florence Nightingale. Her companion was a man, older than she, the parish clergyman, and a great friend of her father's. Florence often went with him on his visits to the poor and sick of the parish. Farther down the lane they came upon old Roger, a

sheep herder. He was trying with little success to drive his sheep into their pen. Florence turned to her companion.

"Let's stop a minute," she said tightening the rein of her horse, "something is wrong with Roger's sheep. They are behaving badly." For a minute Florence and her friend watched the old shepherd. Then suddenly Florence realized what was the matter. "His dog, Cap, is not there to help him," she said, and she called out to Roger to ask where Cap was.

"Oh, Miss Nightingale," said Roger, coming up to them, "Cap will never be of any more use to me; I'll have to hang him, poor fellow, as soon as I go home tonight."

Then he went on to explain that some schoolboys had thrown a stone at Cap and broken one of his legs. The dog was unable to step on the injured leg and had to be left at home while Roger went to care for the sheep. It was plain to be seen that the old fellow was very fond of his dog and hated to lose him. Florence loved animals and could not bear to think of Cap being killed. As she and her friend rode on, she told him what an unusually intelligent and helpful dog Cap was, and how Roger lived alone in his little cottage with only Cap for companionship.

"We will go and see poor Cap," said the clergyman, "I don't believe the leg is really broken." He had studied medicine when he was a young man and he knew it would take a big stone and a hard blow to break the leg of a big dog like Cap.

When they reached the shepherd's cottage and were let in by a neighboring boy, they found, as they had hoped, that Cap's leg was not broken but only badly injured so that he suffered terribly.

"Rest is all Cap needs. He will soon be well again," said the vicar.

The Young Nurse

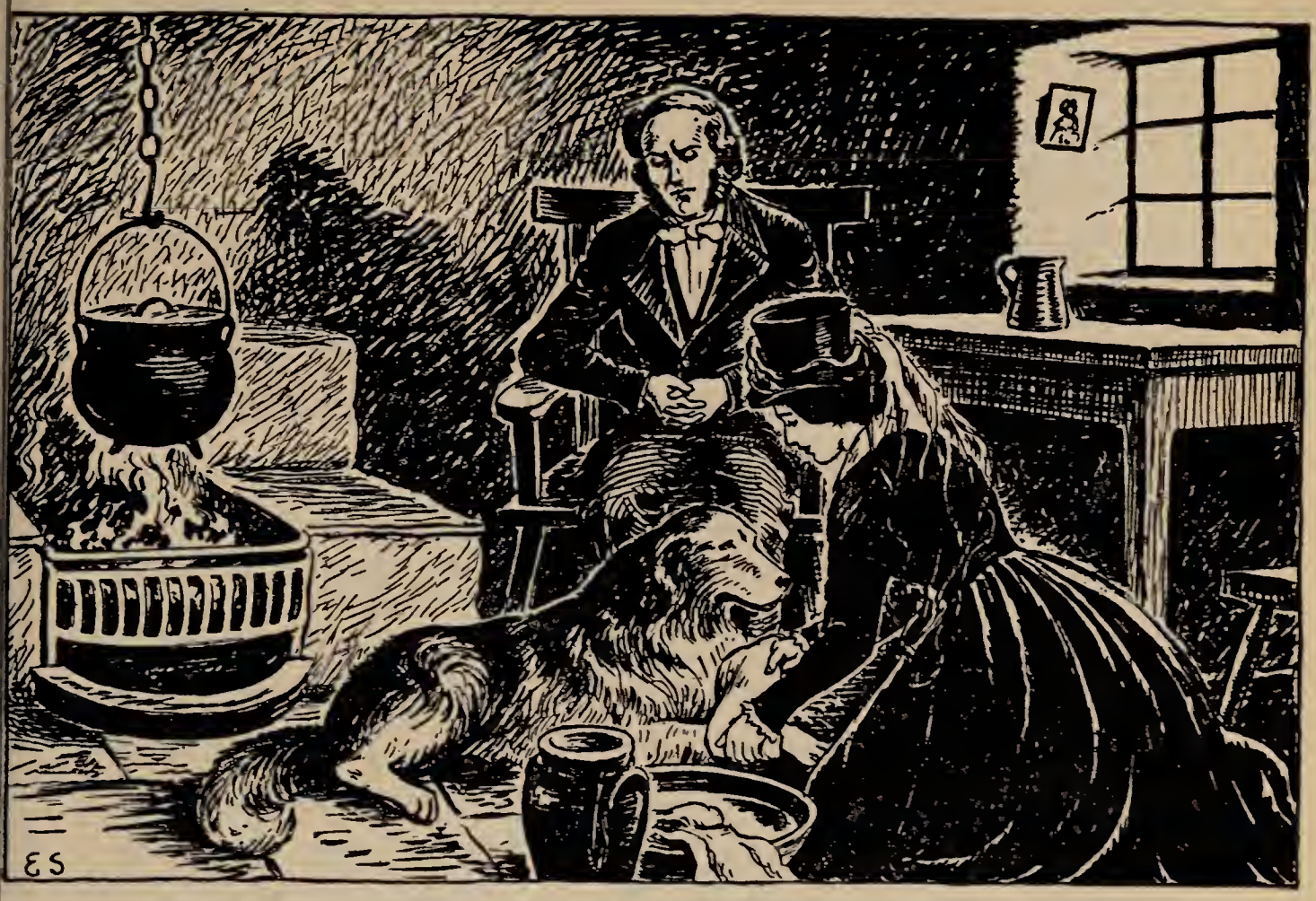
"But isn't there something we can do to keep him from suffering so much?" asked Florence.

"Wrapping the leg in cloths wrung out in hot water would ease the pain and help the leg to heal sooner," replied the vicar. That was the kind of thing Florence enjoyed doing. Soon she had heated water and torn up old flannel into strips and wrapped hot compresses around the dog's leg. Cap seemed to understand that the girl was trying to help him. She did everything she could to make the poor beast comfortable, and then she and the vicar had to leave. On their way home they met old Roger coming slowly along with a piece of rope in his hand.

"Oh, Roger," cried Florence, glad to bring good news, "you are not to hang poor old Cap, his leg is not broken after all."

Florence returned the next day to care for the dog's leg, and it mended so rapidly that soon Cap was back again with old Roger helping to tend the sheep.

This is one of many stories of Florence Nightingale's girlhood. It is probably true, and it shows her



Florence bandaged the dog's paw

fondness for animals and her love and interest in the sick, the poor, and the old people who lived near her father's estate. She had beauty, a sense of humor, education, wealth, and social position. She was presented at court* and could have filled her time with amusements and social engagements. But these things had small interest for her. When she traveled with her family in Germany, France, and Italy, she found it more interesting to visit hospitals, orphanages, and infirmaries* in these countries and to learn new methods of caring for the sick. It is said that even when traveling with her parents in Egypt she found time to nurse some sick Arabs back to health.

Training

Florence Nightingale's mother was an excellent housekeeper and carefully trained her daughter in this regard. But it was Florence's father who was more in sympathy with her interest in nursing. At that time there were no trained nurses as there are today. Catholic sisters were doing excellent work in caring for the sick, but there were not many of them in England. The women who helped in the large public hospitals were of coarse character and had no training.

Florence Nightingale realized the great need for nurses, and for years she dreamed and planned how she could give up the shallow life of a society girl and become a nurse. Finally she obtained her parents' consent to go to Kaiserwerth, in Germany, the only place at that time where women were trained to be nurses. Later she went to Paris and gained experience by helping in one of the large hospitals of that city.

The Crimean War

Then the Crimean War broke out. English soldiers were sent out to the Black Sea to fight the Russians. Back to England came reports of the terrible conditions among the English soldiers. Hundreds were dying of cold, hunger, and disease. The only person in England who was prepared to help in such a situation was Florence Nightingale. The government asked her to form a corps of nurses to go to the

Crimea and set up a nursing service. They promised her she should have absolute authority over the nurses and unlimited power to draw upon the government for all she thought necessary to the success of her mission. Miss Nightingale started immediately to gather together supplies which she would need and to interview people who might go as nurses. Her sister, who helped her with these preparations, wrote to a friend about Florence Nightingale, "She is as calm and composed in this furious haste . . . as if she were going for a walk." In less than a month she had raised a staff of thirty-eight nurses and started for Scutari in Turkey.

A Dark Picture

There they found the large Barrack Hospital and another hospital near by overcrowded. The corridors were filled with two rows of mattresses so close together that one could hardly walk between them. There were in all about four miles of beds, not eighteen inches apart, and not a single nurse! As one soldier said, "The sick were caring for the sick."

Hundreds of men were sick with dysentery,* fever, and cholera.* There were more sick than wounded soldiers. The food consisted largely of boiled meat. All the cooking was done at one end of the building so that it took three or four hours to carry the food through the miles of beds. "There is not a basin, not a towel, not a bit of soap or a broom," wrote Miss Nightingale to a friend back in England. The

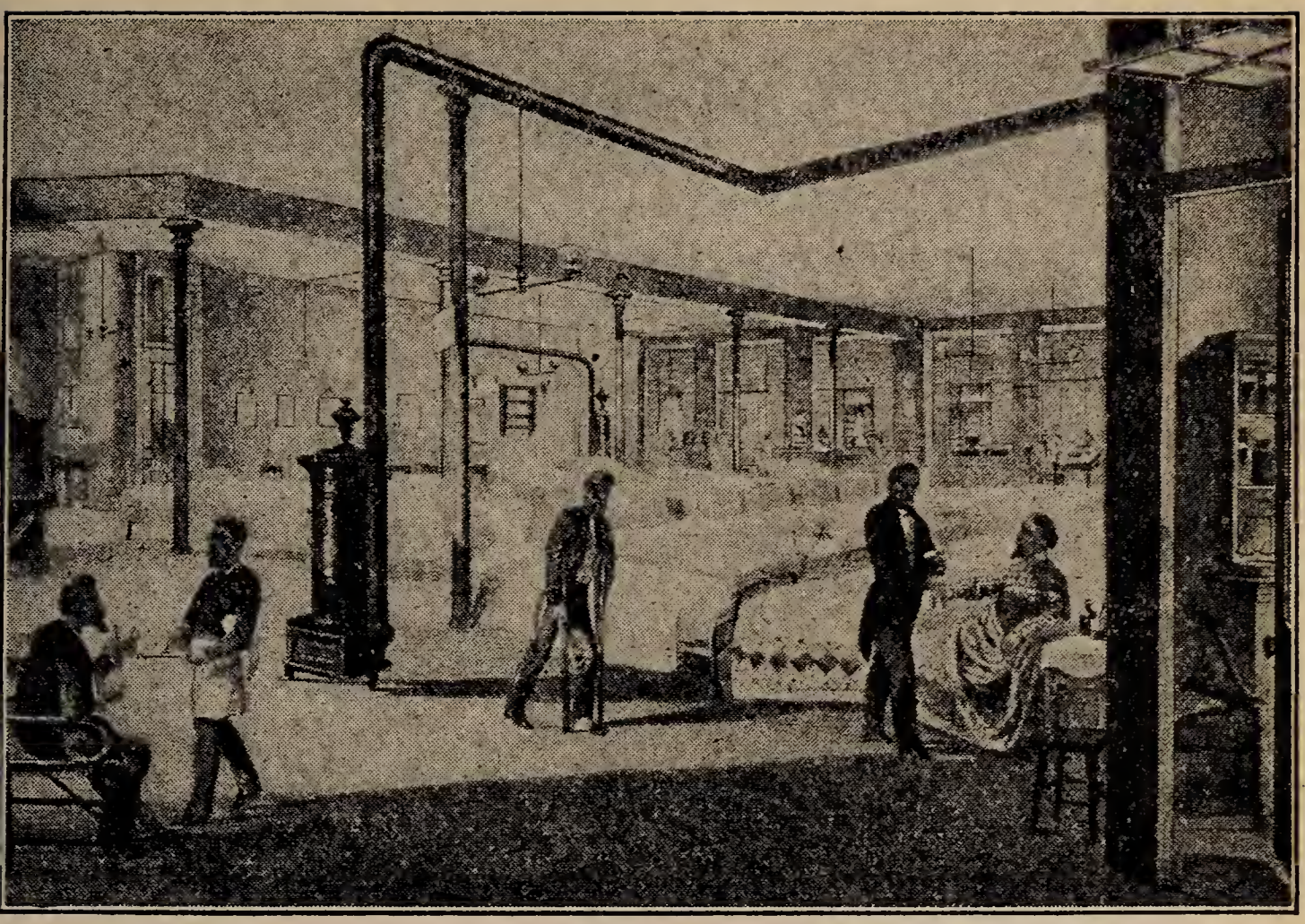
Courtesy Miss Kay Francis and Warner Brothers

Four miles of crowded beds in a Crimean hospital

beds and shirts of the men were in a dreadful condition. Some were still wearing the filthy clothing in which they had been brought down from the battlefield days or even weeks before. One hundred twenty of them had no shirts at all. It is difficult to believe that such conditions could exist among English-speaking people.

To Work

Miss Nightingale and her assistants went right to work. What they accomplished is almost unbelieveable. They bathed and dressed the men and



By Brown Brothers, N. Y.

A United States military hospital of the 1860's

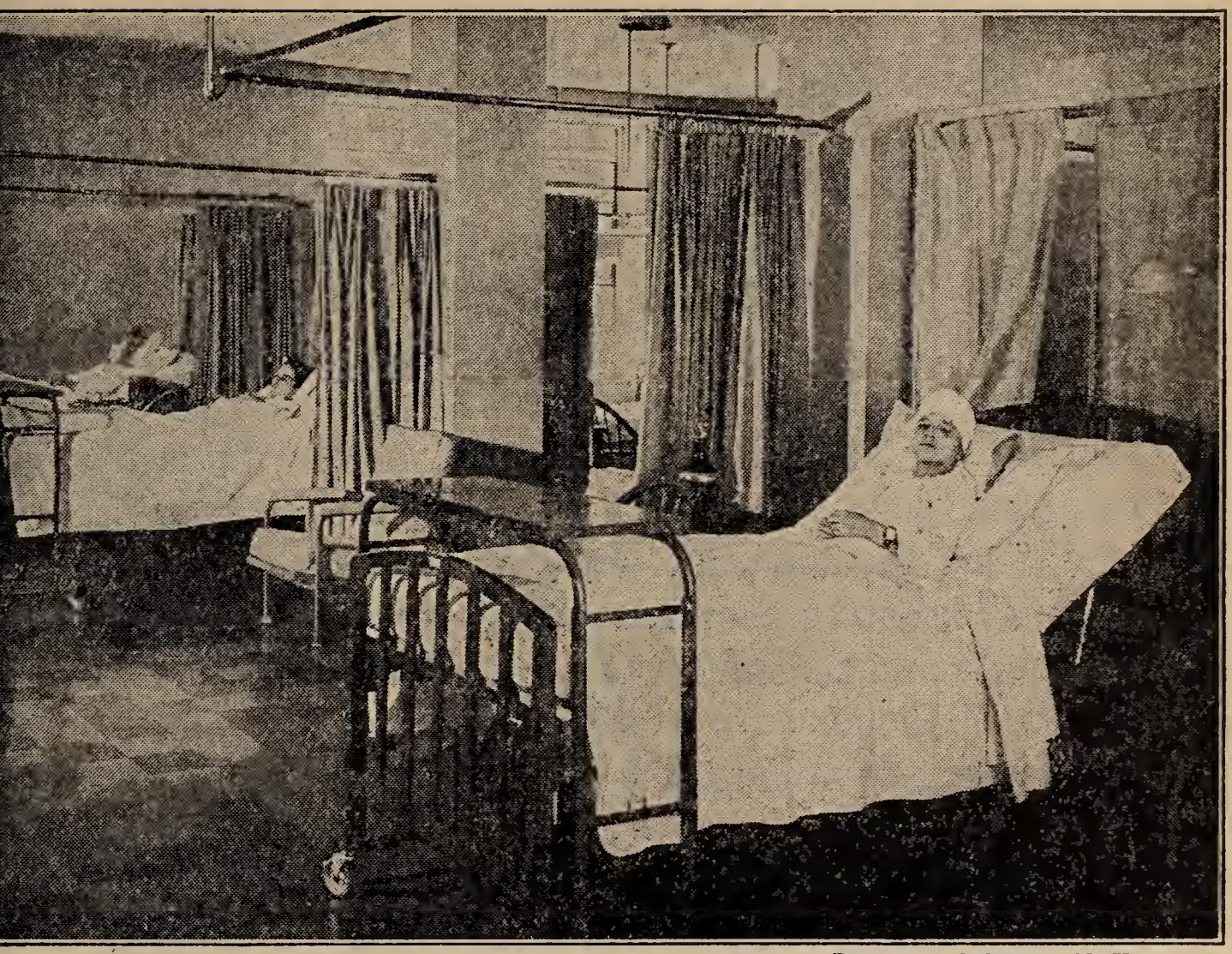
sewed and stuffed fresh mattresses for them. Miss Nightingale made excellent use of the training which her mother had given her in good housekeeping. She established a special diet kitchen so that the very sick could have the right kinds of food. Then she established a laundry so that there could be clean clothes and supplies. She had floors scrubbed and kept clean, the sewage system cleaned out and rebuilt. She provided clothing for the soldiers from her own private stores. She dressed wounds, assisted at operations, distributed supplies, directed work, wrote letters for the sick, and forwarded their little savings

By Brown Brothers, N. Y.

A ward in an early New York hospital

to their friends at home. She seemed to find time to be everywhere.

At night after the medical staff had retired, she took her little lamp and made the rounds of four miles of beds. She would speak to some soldiers and nod and smile to many more. "Of course among all those hundreds there were many of us who could not catch her eye," one of them wrote home, "but we could kiss her shadow as it fell, and lay our heads on our pillows again content." And the soldiers called her "The Lady with the Lamp."



By Ewing Galloway, N. Y.

A ward in a modern hospital

Results

What was the result of this carefulness and cleanliness and cheer? The death rate in the hospitals dropped from sixty per cent before she arrived in November to scarcely more than two per cent in June. And when the war was over, back in England Florence Nightingale continued her reforms. The rest of her long life—she lived to be ninety years old—was devoted to working for better health for everybody. Many people were attracted to her by her ability and her strong character. Her voice

must have been especially gentle, yet strong and persuasive. Her voice and her grace of movement are mentioned over and over again in the stories of her life and in letters of her friends and acquaintances.

Queen Victoria gave her support, and many English statesmen and government officials were her friends and helped her to carry out important public health reforms. She was interested in better health for soldiers, for more sanitary* conditions for the army and other people in India, for more healthful housing conditions for everyone, for cleaner working conditions for laboring people, and for improved construction and management of hospitals. She was called a health missionary for India. Her reforms reduced the death rate among English soldiers in India from sixty-nine in every thousand to only eighteen in every thousand. Today this figure has been still farther reduced to five in every thousand. The good she did for civilians in India is harder to put in figures, because statistical* records for civilians are incomplete. She suggested that the census should include questions which would bring full information about housing accommodations. This is something which was finally attempted in the United States just a few years ago. "The connection between health and the dwellings of the population is one of the most important that exists," said Miss Nightingale. She visited public hospitals in England and found that in many the bedclothes were not changed for months. Two patients were often put in one bed and six or eight children were put in one bed. She established

a training school for nurses, and her teachings on hygiene* and conservation of health have been felt all over the world.

In 1860 Florence Nightingale published a book called *Notes on Nursing: What It Is and What It Is Not.* In the introduction she says, "The following notes are meant simply to give hints for thought to women who have personal charge of the health of others. Everyday sanitary knowledge of how to put the constitution in such a state as that it will have no disease, takes a higher place. It is recognized as the knowledge which everyone should have, distinct from medical knowledge, which only a physician can have."

Florence Nightingale then goes on to say very wisely that she does not pretend to teach people this sanitary knowledge. She asks them to teach themselves, and she says that for this purpose she ventures to give some hints.

A person reading her "hints" at the present time must ask himself, "How could she have understood so well the value of cleanliness, sanitation, fresh air, and other hygienic measures when she did not understand the germ theory of disease?"

"The five essentials for healthy houses," she says, "are: 1, pure air; 2, pure water; 3, efficient drainage; 4, cleanliness; and 5, light."

Pure Air

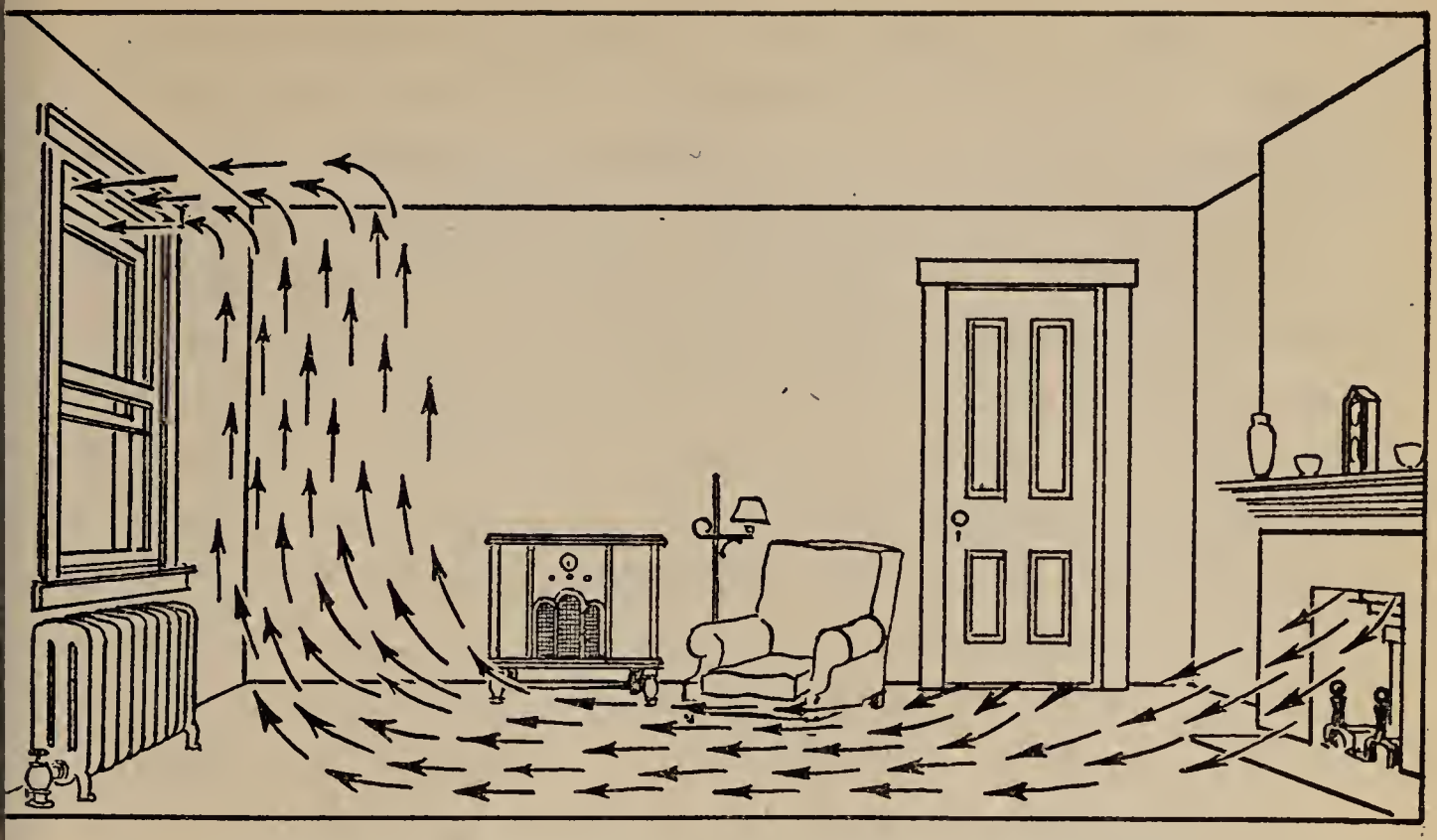
Her views on fresh air show her to be far in advance of the thinking of her time. "An extraordinary

fallacy* is the dread of night air. What air can we breathe at night but night air? The choice is between pure night air from without and foul night air from within. Most people prefer the latter, an unaccountable* choice. An open window most nights of the year can never hurt anyone. In great cities night air is often the best and purest to be had in the twenty-four hours." "Open the window above, not below," she says. "During mild weather and summer time your windows may be wide open."

"The true criterion* of ventilation is to step out of a sitting room, bedroom, or sick room in the morning, into the open air. If, on returning to it, you feel the least suggestion of closeness, the ventilation has not been enough." A famous book on preventive medicine and hygiene, published in 1935, gives this same advice.

"It is very odd how much more regard gardeners have for their plants than women for their children," says Miss Nightingale. "If you were a gardener, you would know that if you admitted air into your greenhouses as almost all women do into their rooms, viz., by a chink at the bottom of the window, the plants opposite the chink would die from the cutting air, and the plants above the chink would die for want of air."

And here is a "hint" of Florence Nightingale's which health teachers are still repeating, "To have the air within as pure as the air without, it is not necessary, as often appears to be thought, to make it as cold." Florence Nightingale goes on to say:



A window open at the top prevents chilling drafts

"The extraordinary confusion between cold and ventilation, even in the minds of well-educated people, illustrates this. To make a room cold is by no means necessarily to ventilate it. Nor is it at all necessary, in order to ventilate it, to chill it." And this confusion seems to exist almost as much today as in 1860. It is still necessary to make people understand that while fresh air is always important, there are times, as, for example, when one has a cough, that cold air and drafts may be harmful.

Pure Water

Florence Nightingale's views on pure water were very up-to-date. She says:

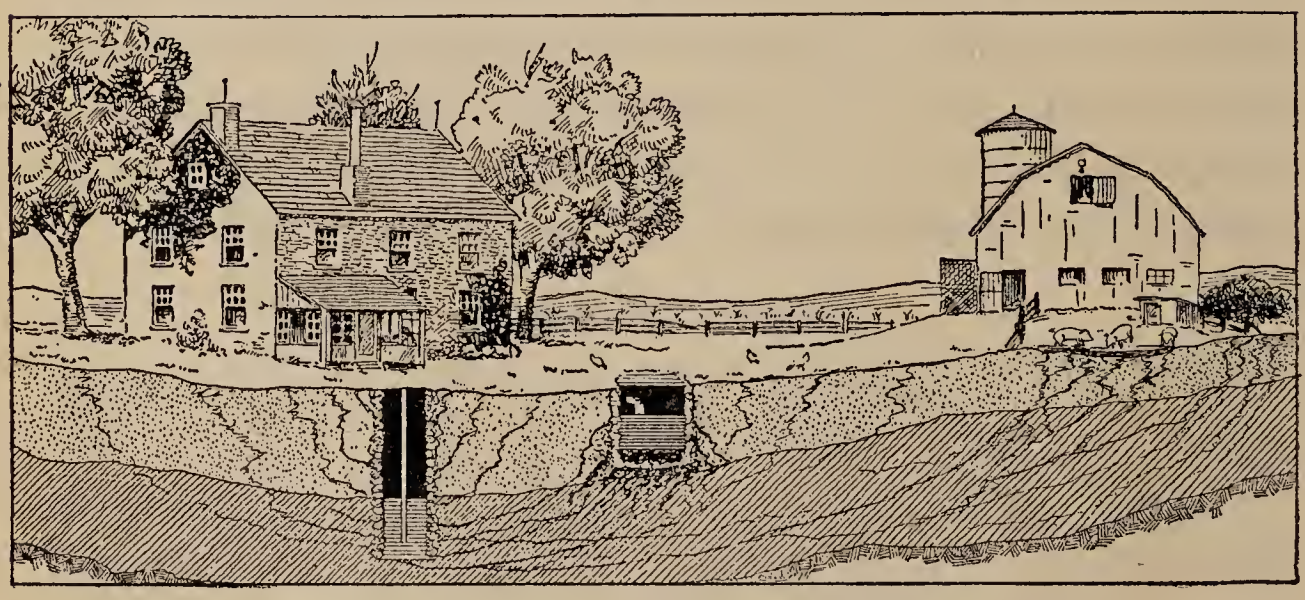
"Pure water is more generally introduced into houses than it used to be, thanks to the work of the sanitary reformers. Within the past few years, a

large part of London was in the daily habit of using water polluted* by drainings of its sewers and water closets. This has been happily remedied. But in many parts of the country well water of a very impure kind is used for domestic purposes. And when epidemic* disease shows itself, persons using such water are almost sure to suffer."

That paragraph can so easily be made to apply today. It would then read: Pure water is more generally introduced into houses than it used to be, thanks to the work of our Boards of Health. Within the past fifty years many of our cities had impure water supplies. This has happily been remedied. But, in many parts of the country, well water of a very impure kind is used for domestic purposes. And when epidemic diseases appear, persons using such water are almost sure to suffer.

Cleanliness

"Without cleanliness within and without your home, ventilation is comparatively useless." These



Why is the water in this well unsafe?

By Ewing Galloway, N. Y.

A reservoir surrounded by hills from which buildings have been removed to lessen chance of pollution

words are also taken from her book. "There are other ways of having filth inside a house besides having dirt in heaps. Old papered walls of years standing, dirty carpets, uncleaned furniture, are just as ready sources of impurity to the air as if there were a dung-heap in the basement." In another part of the book she says, "No ventilation can freshen a room when the most scrupulous* cleaning is not observed. No particle of dust is ever or can ever be removed or really got rid of by the present system of dusting. Dusting in these days means nothing but flapping the dust from one part of a room to another with doors and windows closed. What you do to it I cannot think. You had much better leave the dust alone, if you are not going to take it away

altogether. The only way I know to *remove* dust, the plague of all lovers of fresh air, is to wipe everything with a damp cloth.

"As to floors, the only really clean floor I know is the hardwood, varnished floor, which is wet rubbed and dry rubbed every morning to remove the dust. If you must have a carpet, the only safety is to take it up two or three times a year instead of once. A dirty carpet literally infects a room."

How happy Florence Nightingale would have been if she could have looked forward to the invention of the vacuum cleaner which sucks up the dust and does not "flap it from one part of the room to another!" And our modern homes with no shutters but with large windows so placed that they will get the greatest amount of air and sunshine would surely have delighted her! Her notes on cleanliness in the house are just as true today as they were in 1860. And listen to this:

Light and Sunshine

"A dark house is always an unhealthful house, always an ill-aired house, always a dirty house. Want of light stops growth and promotes scrofula (an old-fashioned name applied to a disease which was usually tuberculosis) and rickets, . . . among the children. Second only to the need of fresh air is the need of light, and it is not only light but direct sunlight they want."

One almost expects her to go on to tell about vitamin D, although that was not discovered, we

know, until about sixty years later. But she had observed in her keen way that direct sunlight was valuable.

"Who has not observed the purifying effect of light, and especially of direct sunlight," she says, "upon the air of a room? Go into a room where the shutters are always shut—you will observe a close, musty smell of corrupt air, of air, i.e., unpurified by the effect of the sun's rays. Put the pale, withering plant and human being into the sun, and, if not too far gone, each will recover health and spirit."

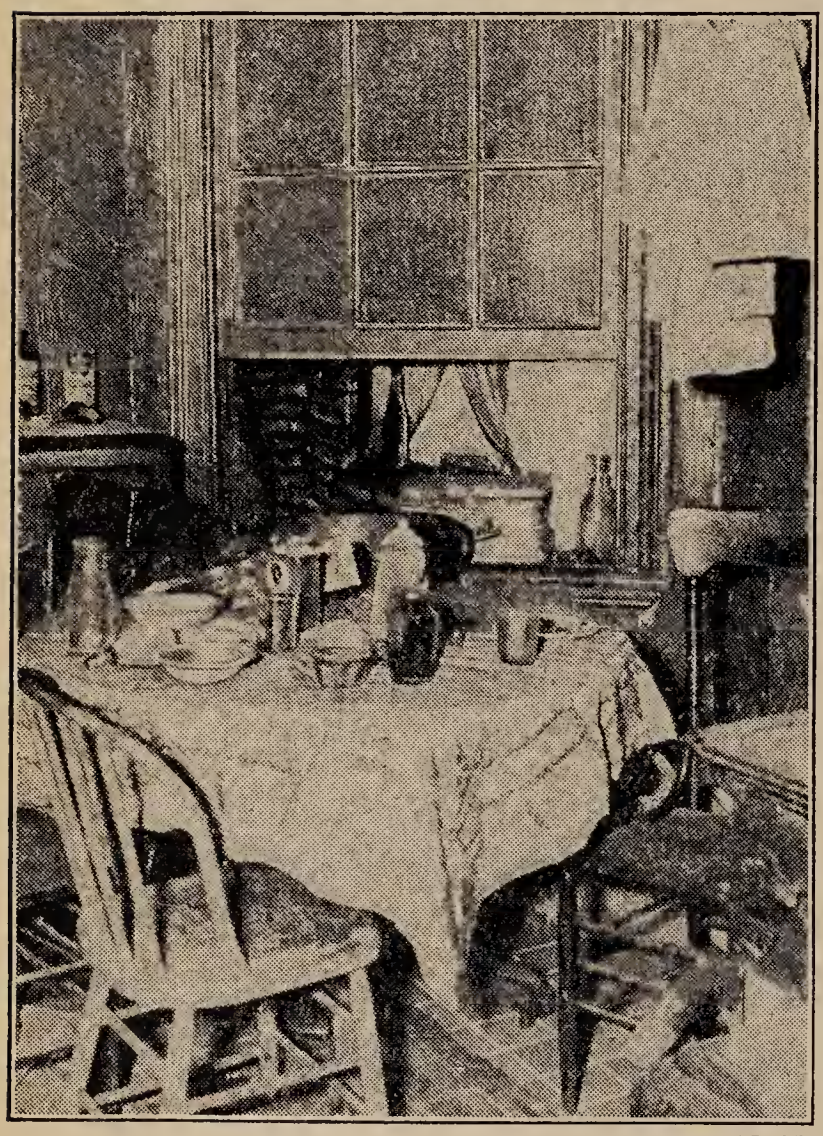
Besides these notes on hygiene in the home, Florence Nightingale's book contains other wise suggestions for healthful living.

Health of Laborers

Besides starting important reforms for improving the living conditions of English soldiers, Florence Nightingale also helped to improve the living conditions of laborers and of the very poor. All her reforms were so well visualized* and so carefully planned that the seeds she planted are still growing. We can see the realization of her visions in our modern factories and hospitals.

This is what she taught: "How much sickness, death, and misery are produced by the present state of many factories, workhouses, workshops, and workrooms! No attention is paid to cubic space or ventilation. The poor workers are crowded, the constant breathing of foul air saturated with moisture, and the action of such air upon the skin, makes

the inmates peculiarly liable to cold. In such places and under such circumstances of constrained* posture, want of exercise, hurried and insufficient meals, long, exhausting labor, and foul air, is it wonderful that a great majority of them die early of chest diseases? Intemperance is a common evil of these workshops. The men can only complete their work under the influence of stimulants* which help to undermine health and destroy their morals while hurrying them to premature* graves. Employers rarely consider these things."

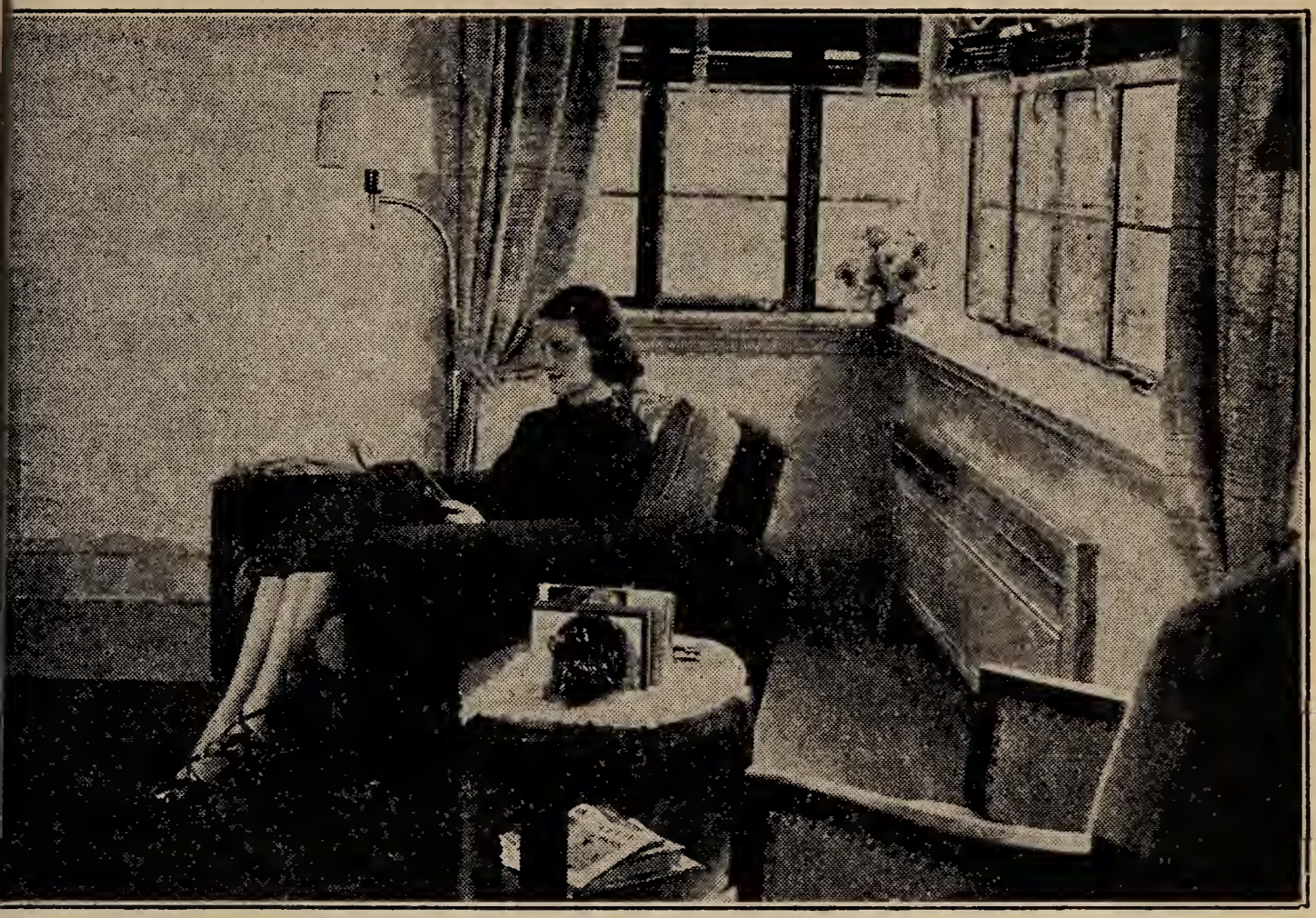


By Acme, N. Y.

A slum room lighted only by an airshaft

Self-medication

The term *self-medication* is often heard today. It means "taking medicines without the advice of a physician." Many times throughout her writing Florence Nightingale repeated that while everyone should understand the proper care of the sick and the well, only physicians were trained to prescribe medicine and treatment for



By Harold M. Lambert, Phila.

Well-lighted room in a suburban home

sick people. Today that facts remains true. Florence Nightingale in her quiet, humorous way gives some excellent "hints" on the subject. She says:

"There are excellent women who will write to London to their physician that there is much sickness in their neighborhood in the country, and ask for some prescription from him which they used to like themselves, and then give it to all their friends and to all their poorer neighbors who will take it. Now, instead of giving medicine of which you cannot possibly know the exact and proper application nor all its consequences, would it not be better if you were to persuade and help your poorer neighbors to remove

the dung-hill from before the door (today we might say "the manure pile from behind the barn") to put in a window which opens, or to cleanse and lime-wash* the cottages? Of these benefits we are sure. The benefits of the inexperienced administration of medicines are by no means so sure. An almost universal error among women is the supposition that everybody must have the bowels opened once in every twenty-four hours or must fly immediately to aperients (an old-fashioned word for mild laxatives* or cathartics*). It is seldom, indeed, that by choosing your diet, you cannot regulate your bowels, and every woman may watch herself to learn what kind of a diet will do this." Miss Nightingale goes on to make some suggestions about diet. We know that frequent use of laxatives is harmful and that vegetables and fruits, especially mildly acid ones, and all foods which contain roughage* are much more healthful than cathartics and laxatives. Florence Nightingale also advises, as we would today, that in cases of severe or prolonged constipation one should see a competent physician but one should not try self-medication.

Personal Cleanliness

Concerning personal cleanliness she says, "The excretion* which comes from the skin is left there unless removed by washing or by the clothes. The amount of relief and comfort experienced by the sick after the skin has been carefully washed and dried is one of the commonest observations made at a sickbed."

What Miss Nightingale says next has never been proved but it is probably true and is one reason why bathing makes one feel so well. She says, "It must not be forgotten that the comfort and relief so obtained are not all. They are, in fact, nothing more than a sign that the vital powers have been relieved by removing something that was oppressing them. Just as it is necessary to remove the air around a sick person frequently (the most up-to-date teaching says that the most comfort is obtained from air that is in gentle motion) so it is necessary to keep the pores of the skin free from all obstructing* excretions."

And here is an interesting statement from Miss Nightingale's *Notes*. "Every nurse ought to be careful to wash her hands very frequently during the day; if her face, too, so much the better." Now if any boy or girl had read that and asked Miss Nightingale why every nurse ought to be careful to wash her hands very frequently, she would not have been able to answer. She knew, because she was a keen observer, that clean hands and health went together, but she did not know that it was so because there were invisible living things called *germs* which could easily get on the hands and cause sickness if carried into the body. She only knew that cleanliness was important. She says, "One word for cleanliness merely as cleanliness. Compare the dirtiness of water in which you have washed when it is cold without soap, cold with soap, hot with soap. You will find that the first has hardly removed any dirt

at all, the second a little more, the third a great deal more."

Those words were written by Florence Nightingale in 1860! In 1931 an American scientist did some experiments with soap and water. He wrote up the results of his experiments in a scientific journal. He had probably never read Florence Nightingale's *Notes on Nursing* but he found that soap and water act upon germs as she said they acted on dirt, for she did not know about germs. This is what the scientist wrote, "Soaps are highly germicidal* against a number of pathogenic organisms (germs which cause disease). Moreover it was shown that the activity of soap was at least doubled when the temperature of the water was increased to 35° C. (98° F.) that is, to about body temperature, and the activity was still further enormously enhanced* when hot water (45° C.; 116° F.) was used." There are Florence Nightingale's teachings, 1931 model.

Toward the end of her notes on personal cleanliness, Florence Nightingale mentions, even as a modern health book would mention, the advantages of soft water over hard water, and the benefits of rubbing the body all over with a rough towel.

Modern Ideas of Personal Cleanliness

All these quotations from Florence Nightingale's writings show quite clearly how advanced were her views on health and sanitation. She proved at Scutari that improved cleanliness, sanitation, and good cheer can bring about improved health. But

Plenty of soap and warm water remove germs

since she wrote her *Notes* living conditions have changed. More people have access to bathtubs, shower baths, hot running water, and swimming pools. Many people feel that in order to be clean they must bathe every day. Others are satisfied with a bath just once in a while. There are people who change their underclothing and nightclothing every day. For others the extra work and expense would make this impossible.

Many people have to do very dirty work. They must get their hands and faces and even their bodies dirty. This dirt does no harm if it does not get inside the body. Generally a healthy skin is dirt-proof and germ-proof. But dirt may be carried into

the body through the mouth upon food touched by dirty hands. It may also get into the body through a cut or scratch or puncture of the skin. Dust and dirt may be very harmful if they get into the eyes or are breathed into the lungs. Clothing may be very dirty and not cause disease, but it is well known that body lice are often found in such clothing and diseases caused by them are much more common in countries where bathing and clean underclothing are not so popular as in this country. Even if one is doing the most dirty work there is no reason why one cannot be clean at least part of each day.

Considering all this, one might say that if a person wants to be clean he should have *at least* the following habits:

1. He should wash his hands with soap and water before eating and after going to the toilet.
2. He should have two warm, soapy baths, or the equivalent, a week.
3. He should keep his hair and scalp and fingernails clean.
4. He should clean his mouth and teeth carefully at least twice a day.
5. He should always carry a clean cloth or paper handkerchief.
6. He should keep filth, dust, and dirt from getting inside his body.
7. He should change his underclothing at least twice a week and stockings oftener. His outer clothing should be as neat and clean as his occupation will permit.

By International News Photos, Inc., N. Y.

A modern swimming pool

8. He should dispose of all bodily discharges where they cannot contaminate* anything.

These might be called the essentials of personal cleanliness. They are possible to every person. They are necessary the year round. These essentials might be said to form the lowest standard that is compatible* with health. A higher standard is desirable. A daily cool bath, two or three warm soapy baths a week, immaculate* underclothing, and perfectly clean outer clothing, are all highly desirable. But all these things should be done only because they make one feel better and look better; they never should be carried to the point of fussiness.

In bathing as in everything else extremes are to be avoided. The very cold bath and the very hot bath are an unnecessary shock to the body. A cool bath is exhilarating and refreshing. It wakes one up and starts the blood to circulating faster. A warm bath is soothing and warming, it will warm you when you are chilled and soothe you when you are exhausted and want to go to sleep.

There are many fancy kinds of baths such as mustard baths, salt baths, sulphur baths. Many claims are made for the special value of these baths, but it is both safe and sensible to use ordinary water and pure soap. To use anything else shows unnecessary fussiness except in certain abnormal conditions for which a competent physician should prescribe. A shower bath is pleasant and can be taken in a short time, but one can keep just as clean with a bowl of water and plenty of soap. A tub bath is so comfortable that there is sometimes a temptation to dawdle.* It is polite after a tub bath to leave the tub clean for the next person.

Toilet Preparations

It does not take most people long to discover that besides bringing health, cleanliness makes friends and helps a person to succeed. Cleanliness is more popular than it was in Florence Nightingale's time, and her teachings have helped to make it so. Printed matter is also distributed more widely, and that brings a new problem because people are constantly being informed through articles and advertisements,

books, booklets, and billboards of various toilet preparations. Persons who do not read about these things are almost sure to hear about them over the radio. How is one to judge the value of these articles or the truth of their maker's claims?

Here are some things to remember. Mild soaps are all about equally good for the skin. The cost of soap depends more upon the weight and the cost of the perfume that is put into it, than upon the effect which it has upon the skin. Medicated* soaps are not any more effective in killing bacteria than ordinary soaps. The effectiveness of a soap depends upon the strength of the lather, the amount of rubbing and scrubbing, and the hotness of the water. Cold creams and oils have their place in the care of dry skin, but nothing is as cleansing as pure soap and warm, soft water. Anyone who understands that vitamins are food essentials would know that they do not add to the value of toilet preparations which are made to be applied only on the outside of the body.

Sound scientific knowledge, an alert mind, and plenty of common sense should help people to judge the value of toilet preparations. There are also departments in every State university and in the American Medical Association and the American Dental Association, both in Chicago, which are maintained especially to study the truth of advertising claims and answer questions about them. When writing to any of these places always enclose a stamped, self-addressed envelope.

★ Visiting Nurse Associations

In March, 1877, the Women's Branch of the New York City Mission was the first in the United States to send trained nurses into the homes of the "sick poor" as visiting nurses. All these nurses were graduates of hospital training schools. The work of these missionary nurses was twofold. In addition to caring for the sick, they were expected to use every means in their power to improve the health and morals of their patients' families, but chiefly to give people religious instruction.

Shortly afterward, the New York Ethical Society placed four nurses in a new kind of service. Their work differed from that of the missionary nurses. It was directed from medical centers, and health care rather than religious instruction was their first responsibility.

In 1885 and 1886 the first visiting nursing associations were established in our country. They were founded in Buffalo, Boston, and Philadelphia. Each differed from all preceding organizations of the kind in the United States in that its sole purpose was to send trained nurses directly into homes.

By 1890, thirteen years after the first nurses were sent out by the New York City Mission, there were twenty-one visiting nursing organizations in the United States. Each association worked independently of the others. Their work was founded solely upon local conditions. They had no common standard, either in regard to practical work or the educational requirements for their nurses.

In spite of this rapid early development in a new field, the growth of public health nursing made no great strides until 1905. Then new organizations were formed. Many more nurses were employed. A new interest pointed to a remarkable future.

The National Organization for Public Health Nursing was organized in 1912 to "promote and develop public health nursing through service to individuals and local, State, and national agencies concerned with this field and through a development of standards for the work and workers."

Today all of our forty-eight States have public health organizations. The legislature of each State sets aside money for the use of the State Board, or Department of Health. The amounts, of course, vary. They depend largely upon population, education, interest in public health, and the nature of the health organizations of the State.

Public health nursing includes a variety of organized community services carried on by graduate nurses to individuals and family groups. The chief purpose of the work originally was to give bedside care in the home. Now, in addition, all public health nurses are qualified to give health instruction in the home. Group instruction also is given in classes, clubs, or at meetings. The aim is to reach not only those whose health is concerned but those who feel such knowledge will enable them to be of help to others.

One of the most unusual visiting-nurse groups is the Frontier Nursing Service. The territory covered

by these thirty highly-trained women covers an area of 700 square miles of mountainous land in eastern Kentucky. There are only twenty-four miles of gravel highway in this area; horseback and mule-back are the only means of transportation. Creek beds often serve as a poor substitute for modern roads.

For this vast territory which the Frontier nurses serve, there is only one eighteen-bed hospital—wholly inadequate for their need. They are thoroughly familiar with all branches of nursing and are excellent horsewomen as well. In eleven years this organization has cared for over 2,000 mothers in childbirth. It has inoculated more than 77,000 individuals against common diseases. It has carried on a successful campaign against trachoma (a contagious inflammation of the eyelids) and the hookworm. These are two of the most dreaded diseases with which these Kentucky mountainfolk are afflicted. They are all very poor and live in the most primitive conditions. The Frontier nurses also teach mothers how best to care for their families in their poorly furnished homes.

Do You Know?

On the next page are some questions. Study these questions and see if you can answer them. If you cannot answer any question, turn to the page number following the question and study that page. Then turn back to page 137 and see if you can answer all the questions.

1. How does physical fitness help to prevent accidents? (page 64)

2. How does mental fitness help to prevent accidents? (page 64)

3. In what ways may worry cause accidents? (page 66)

4. Why do more children under five years of age die of burns than older children? (pages 63, 70)

5. How can "unloaded guns" kill people? (page 76)

6. Why are practical jokes often dangerous? (page 83)

7. What is meant by "first aid?" (page 90)

8. Why does a bruise sometimes cause black-and-blue marks on the skin? (page 91)

9. What is a sprain? (page 91)

10. What is a hot compress? (page 91)

11. What is a cold compress? (page 91)

12. What "first aid" should you give if a person has a fracture? (page 92)

13. How can you tell when an artery has been cut? (page 92)

14. What is a tourniquet, and for what purpose is it used? (pages 92–93)

15. What should not be done if a person has injured his back? (page 92)

16. How can you stop a cut from bleeding? (pages 92–93)

17. What is one of the chief dangers from a bad scratch? (page 94)

18. If you are burned by fire, what is the best thing to do? (page 94)

19. If you are burned by an alkali, what is the best thing to do? (page 94)

20. If you are burned by an acid, what is the best thing to do? (page 94)

21. If you are scalded by a hot liquid or steam, what is the best thing to do? (page 94)

22. What causes a person to become unconscious? (page 95)

23. How can you tell whether a person is unconscious? (page 97)

24. What is an emetic? an antidote? (pages 99, 100)

25. What is the most important thing to do in case of a bad accident? (page 102)

26. Why is it better to use a vacuum cleaner than a broom for keeping rugs clean? (page 122)

27. Why are clean people usually more popular and successful than dirty people? (page 132)

28. What are the qualities to look for in soap? (page 133)

29. How can you determine the true value of toilet preparations? (page 133)

30. What is meant by *self-medication?* (page 124)

Things to Do

1. If you live in a town or city, ask your teacher if you can plan a trip to your city waterworks. Find out the source of your water and what is done to purify the water.

2. Write a list of things you can do to help to keep your school building clean.

3. If you live in the country, discuss the source of your water supply with your parents. Find out whether the water you use is pure or if anything can be done to make it purer.

4. Write a list of things you should do to keep yourself clean.

★ 5. Make some posters to remind your classmates that they can help keep your school building clean.

By Acme, N. Y .

CHAPTER VIII

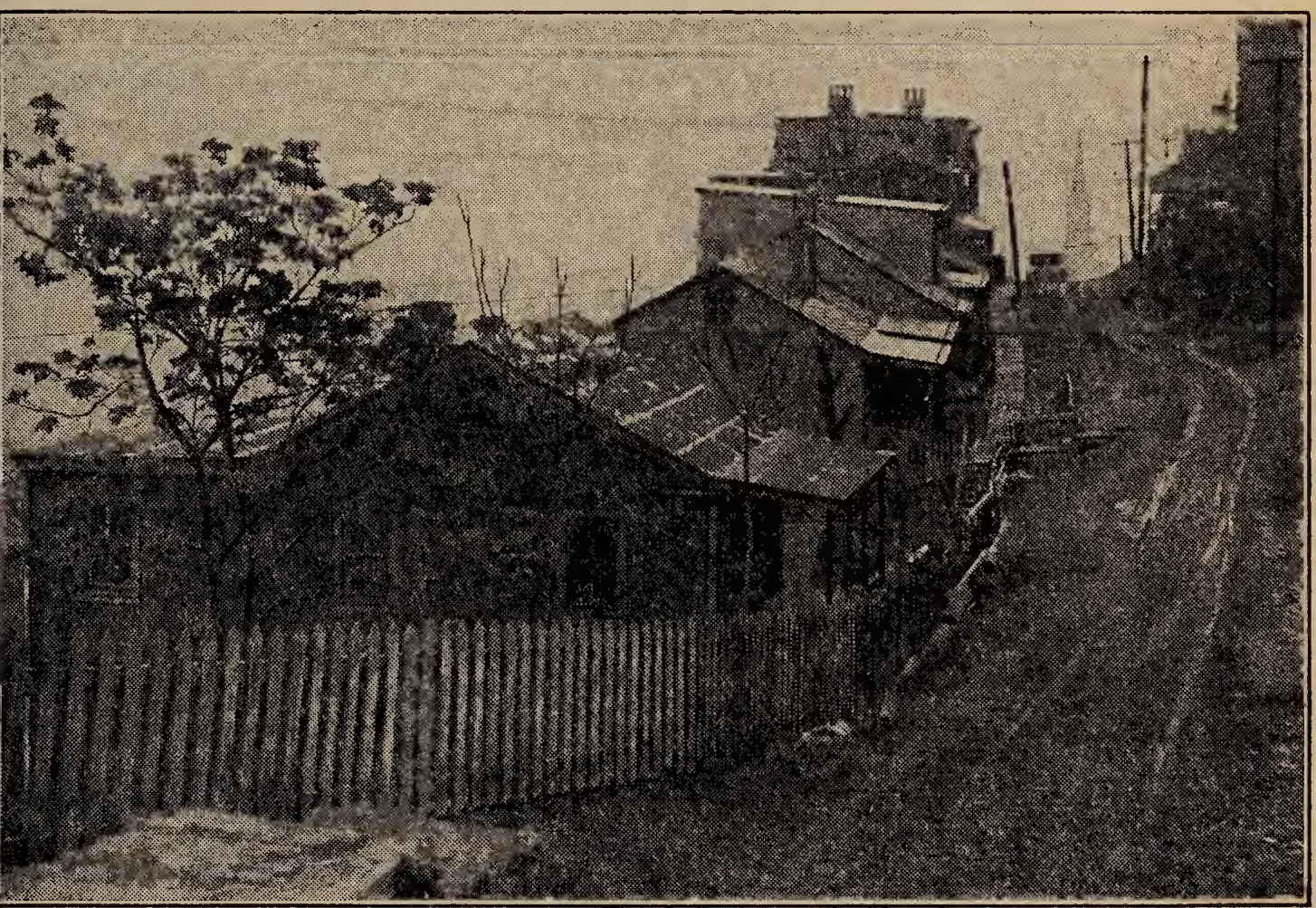
Making a Community Healthy

Bad Living Conditions

Jane Addams was not yet seven years old when she had her first glimpse of living conditions among the very poor people of a city. She was a country child, born and reared in a village in northern Illinois. Sometimes she went with her father to a neighboring city of about ten thousand people. Here she was allowed to visit the toy shop, a wonderful place to her childish eyes. She was also allowed to visit the

candy shop. She had always thought of the city as made up of such attractions until one day her father's business took him to a mill which was situated in the poorest quarter of the city.

She had seen poverty before. Country people were often poor, but they had the health and freedom which comes from living amid fields and gardens with plenty of fresh air. "Oh, why," she asked, looking in amazement at the unpainted shacks set in filthy little yards, "do people live in such horrid little houses so close together?" Her father tried to explain to her that these people worked in the



By Ewing Galloway, N. Y.

Unpainted shacks set in filthy little yards

mill and that such living conditions had developed with the coming of machinery.

"When I grow up," she declared firmly, "I am going to have a large house, but it won't be built among other big houses. It will be right in the midst of horrid little houses like these." Her father looked kindly down at his little daughter beside him. She had such earnest eyes, but her head was held very much on one side because her spine was crooked. Little did he realize that many years later this child would actually carry out the idea which had been born at her first sight of squalid* poverty.

Thinking of Others

One day Jane dressed for Sunday school in a new coat. It was the most beautiful coat she had ever had so she hurried to her father and stood before him waiting anxiously for his approval. He looked at her quietly and finally said, "It is a very pretty coat. In fact, it is so much prettier than any coat the other little girls in Sunday school have that I should advise you to wear your old coat. It will keep you quite as warm as this new one, and it will not make other little girls feel unhappy to think they cannot have new coats."

Jane turned slowly away. She adored her father and was ready to do anything he advised although she could not understand why this great sacrifice was necessary. Clad in her old coat she walked silently beside her father on the way to the church. She was thinking and wondering why it is that some

people have everything they need and more, while others have so little. As they neared the church, she turned to her father.

"Isn't there something we can do so that some people won't have so little while others have so much?"

"Well," replied her father, "these things may never be righted so far as clothes are concerned, but people can be equal in things that matter much more than clothes. We can make sure that people have equal opportunities* and equal education. You are helping in that when you go to school, Jane. And," he added, "it would be stupid to wear the sort of clothes that make it harder to have equality even there."

This striving to help everybody to have equal opportunity finally became the ideal for which Jane Addams lived. And she was more able to realize this ideal because of another great truth which she learned from her father.

She had come to him, as she so often did, with a problem which was troubling her. She was worried because she could not understand it. Her father said, "It doesn't matter whether one understands everything one hears discussed, but it is very important not to pretend to understand what you don't understand. You must always be honest with yourself inside, whatever happens." Years afterward when Jane Addams had become one of the outstanding women of America and the world, she said in a book describing her work, that this lesson about

being honest with yourself was one of the most valuable she had ever learned.

These serious conversations with her father were only part of Jane Addams' childhood. She also enjoyed a wholesome country life. On her father's land at the edge of the village there was a mill stream whose banks rose into high bluffs containing caves. Here she and her stepbrother used to carry on games which lasted week after week and sometimes summer after summer. They had their favorite places and trees and birds and flowers. They loved to hunt for the first wildflowers in the spring or dream of the pot of gold which is said to lie at the end of the rainbow. They played house in the empty bins of the flour mill which stood on her father's farm or roamed in the grove of Norway pine which her father had planted on the top of a hill near her home.

Jane Goes to College

In those wholesome* surroundings Jane Addams developed mentally and physically until she was ready for college. She attended Rockford College for Women. Here each student made her own fire and kept her own room in order. Sunday morning was a great clearing-up day. One of the vivid* recollections of college which stayed with Jane Addams all her life was this sense of having made her own immediate surroundings immaculate. "This sense of cleanliness," she wrote many years later, "is said to be close to the consciousness of a clean

By Ewing Galloway, N. Y.

The play room at Hull House

conscience.*" It always mingled in her mind, she said, with the reading of Greek which took place later on Sunday morning in the exquisitely* neat room of the teacher of Greek.

Jane Establishes Hull House

It was in 1889, eight years after leaving college, that Jane Addams finally made her childhood dream come true. Upon her first sight of squalid poverty, as a little girl, Jane Addams had declared that she was "going to have a large house right in the midst of horrid little houses." Now this same little girl

was a college graduate who enjoyed the "immaculate cleanliness" of her own and her teachers' rooms, who had studied Greek and Latin, and had spent years in foreign travel and spoke several languages.

She and a companion, Ellen Gates Starr, established themselves in a large house in one of the foreign districts of the city of Chicago. They furnished the house as they would furnish their own home with furniture of good quality, with photographs and other interesting things which they had collected in Europe. They tried to have the house reflect the culture and good taste of the residents. They called it Hull House. Here Jane Addams began her life work of bringing friendship and hospitality* to the people who lived in this district.

Conditions around Hull House

These foreign people were not familiar with our American system of self-government, whereby each person is responsible for the care of himself and his family and where citizens work together for community, city, State and national improvement. Because these foreign people did not understand the privileges and responsibilities of self-government, the streets of the neighborhood were filthy; there were not enough schools; the sanitary laws were not enforced; the street lighting was bad; the street paving was miserable, and the alleys and smaller streets were not paved at all, and the stables were indescribably foul. Hundreds of houses were not connected with the street sewer.

The houses, most of them wooden, were originally built for one family, but as the district became poorer, several families had crowded into each house. There were a few comparatively new brick tenement buildings, but many houses had no water supply save a faucet in the backyard. There were no fire escapes, and the garbage and ashes were placed in wooden boxes which were fastened to the wooden paving blocks of the street. Nothing was done to change conditions because everyone took the attitude that that part of town would soon be built up with factories or warehouses anyway, so why improve it. In the meantime people went on living there, and at least two generations of children were reared under the old conditions.

The district was also well known as the largest winter resort for gypsies in the United States. They seemed to prefer living on busy Halstead Street. Perhaps this was because the stream of people passing by afforded so much more opportunity for fortune-telling or trading. Perhaps it was easier there to secure an empty loft or large floor space upon which they camped in family groups as if they were still living under the open sky. Twenty people were found in one such room with an old man dying of tuberculosis.

Jane Addams had set out, as she said, "to learn of life from life itself." She felt that reading about life, even as it is depicted in the best of literature, or seeing it as it is reproduced in great paintings, is but one fourth of living. The other three fourths

consist in creating a better life for oneself and others, in doing something besides studying. The study of health is only a small part of healthy living. It is worth while only if it inspires one to improve one's own body and mind and to help others to live more healthfully.

Jane Addams lived at Hull House so that she could be a good neighbor to many people. This often led to activities which were directly related to health. Many of them are worth repeating here.

The Day Nursery at Hull House

"We early learned to know the children of hard-driven mothers who went out to work all day," said Miss Addams. "Sometimes the little things were left in the casual* care of a neighbor, but often they were locked into their tenement rooms.

"The first three crippled children we encountered in the neighborhood had all been injured while their mothers were at work; one had fallen out of a third-story window, another had been burned, and the third had a curved spine due to the fact that for three years he had been tied all day long to the leg of a kitchen table, only released at noon by his older brother who hastily ran in from a neighboring factory to share his lunch with him.

"When hot weather came, the restless children could not brook the confinement of the stuffy rooms, and, as it was not considered safe to leave the doors open because of sneak thieves, many of the children were locked out. During our first summer, an

By Keystone View Co., N. Y.

Rest time in a day nursery

increasing number of these poor little mites would wander into the cool hallway of Hull House. We kept them there and fed them at noon, in return for which we were sometimes offered a hot penny which had been held in a tight little fist ever since Mother left this morning, to buy something to eat with."

These activities were the beginning of the day nursery at Hull House. Nowadays there are day nurseries in many of the cities of this country. They help to insure the health and safety of children

by giving them a hot, nourishing lunch at noon and a safe place in which to play. Still better than day nurseries are mother's pensions by which the State pays mothers to stay at home and take care of their children if there is no father to provide for them. The future of our country depends upon the children of today. If our country is to improve, these children should be developed into citizens with strong bodies and healthy minds.

The kindergarten teacher at Hull House was shocked one day when one of her small pupils came to school in a state of intoxication from the wine which had been given her with bread at breakfast. The child had to be sent home because she was too sick to stay in school. The kindergarten teacher tried to tell this foreign mother that bread and pure milk would make her child grow and would not make it sick as the bread and wine had done.

Table Manners

At another time the kindergarten teacher found that people with good table manners are considered more attractive than those with poor table manners. One day in kindergarten a polite little boy refused to sit by one of the little girls in his class.

"But why," asked the teacher, "don't you want to sit by Mary?"

"Because," replied the boy, "we eat this way," and he pretended to take food from his plate to his mouth with a fork, "but she eats this way," and he held his hand high in the air and threw back his head

By Ewing Galloway, N. Y.

Lunch time at Hull House

with his mouth wide open to receive the handful of imaginary food.

The teacher in describing this incident to Miss Addams added, "But isn't it surprising that merely table manners are made such a test all the way along?"

Sweatshops

One of the greatest evils which Jane Addams found in the neighborhood of Hull House was a system known as *sweating*. This method was used freely by the manufacturers of garments to save themselves

money. Under this system, most of the work was done by the women and children in their own homes. Thus the manufacturer was saved paying rent on a large factory. The people who worked for him were always overworked and underpaid. Usually just a few cents were paid for finishing a dozen garments. The manufacturer would rent some cheap basement where the clothing was cut. Then it was taken to the homes. But they were not homes in the best sense of the word. They were basements or stable lofts or rear shanties or crowded tenement rooms where people lived and worked in filth and darkness and disease. Only in such places could the manufacturer get his work done as cheaply as he desired. He did not care if disease was spread in this way or if workers strained their eyes to blindness in the dark rooms.

Child Labor

Long hours of factory work are anything but wholesome for a growing child, and Miss Addams and her co-workers determined to do something about it. They brought it to the attention of the State legislators, and, after thorough investigations into the sweating system and child labor, the first factory law of Illinois was passed. It attempted to regulate the sanitary conditions of the sweatshop and fixed fourteen as the age at which a child might be employed. It is thus that many of the laws we now have regulating the health conditions under which people live and work are begun by one person

By Anne Shriber, N. Y.

Sweatshop workers were overworked and underpaid

who inspires others to join him in a movement to bring about better conditions. This is the way things are done under a democratic form of government such as ours.

It was soon found, however, that a law in Illinois did not affect sweatshops in other States, and it was found that outbreaks of scarlet fever in rural districts could be traced to wearing winter overcoats made in city sweatshops. So it was not hard to convince the lawmakers in Washington that disease in rural districts of this country might be the direct result of working conditions in the cities. Under

such conditions national legislation is needed to correct a widespread evil. Unfortunately, even as late as 1937, there was still need for such legislation.

Community Playgrounds

"One of the most piteous aspects in the life of city children, as I have seen it in the neighborhood of Hull House," said Jane Addams, "is constant interruptions to their play, which is inevitable* on the streets, so that it can never have any continuity. The most elaborate 'plan or chart' or 'fragment from their dream of human life' is sure to be rudely destroyed by the passing traffic. Although they start over and over again, even the most vivacious become worn out at last and take to that passive 'standing around' varied by rude horseplay, which in time becomes so characteristic of city children."

Of course children standing around and behaving like this might be better off physically than those who spent long hours in factory work. But they would certainly be worse off mentally; therefore, suitable playgrounds had to be established. The first one was a temporary gymnasium fitted up in a former saloon. The boys came in great numbers until the place became so crowded that a Chicago man who was fond of athletics erected a new building for the children to play in.

Several years later in a public speech someone told of the deplorable conditions in one block in the neighborhood of Hull House. The block was

occupied by small tenements and stables unconnected with a street sewer. The owner of this block heard of the attack which had been made upon his property and he came over to investigate. He found conditions as bad as they had been pictured. He, as well as the tenants, had allowed the property to become so filthy and run-down that he was unwilling to have it to remain in such a state. He offered a free lease to Hull House. The houses were so bad that it was not worth while improving them. It was decided to tear down the worst ones and move the others across the street provided they would never be used for junk shops or saloons. A public playground which fostered health and fun filled the block that had been one of the worst pestholes of disease and misery.

One of the regular festivities held on the playground was a May Day celebration with a Maypole dance and a May Queen. Miss Addams wanted to teach the neighborhood children to help keep their community clean. Therefore, the honor of being queen was promised one year to the little girl who picked up the largest number of scraps of paper from the streets and alleys. The children were given long pieces of stiff wire. They went about stabbing papers and collecting them on the sharp end of the wire. Then they took their "catch" and counted off the number of pieces of paper as they deposited them in a large box in the Hull House alley. The winning girl was very happy, because she had worked hard for the honor of being May Queen.

By Ewing Galloway, N. Y.

The Community Kitchen

While visiting neighborhood homes to investigate sweatshops, Miss Addams found that during the busy season the women sewed so hard and so long in order to earn any wage that they paid little attention to feeding their families. For when one is paid only five or seven or nine cents for finishing a dozen pairs of trousers, it takes long hours of hard work to earn enough to pay the rent.

Meals under these conditions usually consisted of cheap canned goods which could be quickly heated or a few cents worth of candy. The kitchen at Hull House was therefore equipped to cook cheap cuts of meat and simple vegetables and so provide nutritious food for the families who so sadly needed more wholesome meals. However, the kitchen was not patronized as the residents at Hull House had hoped. One woman in the neighborhood confessed.

"Yes, I'm sure the food is nutritious, but you know, I don't like to eat what's nutritious. I'd just ruther eat what I'd ruther."

However, a certain amount of carefully prepared soups and stews were sold in the neighboring factories, and this sale has increased steadily through the years.

The Labor Museum

The Hull House classes in cooking were much more successful than the public kitchen, and probably in time served the same purpose of teaching the need of nutritious food and how to prepare it inexpensively. To one of these classes there came every Saturday

By Underwood and Underwood, N. Y.

A spinner at Hull House

evening a young Italian girl. Her mother came with her and spent the evening in the Labor Museum. However, the girl always left her mother near the front door while she herself went around to the side door. She did not wish to be regarded by the rest of the cooking class as the daughter of an Italian woman who wore a kerchief over her head, heavy boots, and strange, full skirts.

The Labor Museum where the mother spent her evenings was Jane Addams' idea. She wanted her foreign friends to see that the spinning, weaving, and knitting which they had done in their own homes in Europe were the forerunners of the work which was done by their children in factories in this country. Therefore, in one room at Hull House she had assembled spindles, spinning wheels, and looms of various kinds, and here the foreign women who had been trained in these hand crafts in Europe put on exhibits. Americans who came to see the Museum

marveled at the beautiful handwork which these women could do, and they felt more sympathetic toward these people who by the coming of machinery had been deprived of an opportunity to pursue their crafts.

One evening the little Italian girl saw her mother surrounded by a group of visitors from the School of Education of the University. They were admiring her mother's spinning, and the girl heard one of them say, "Why, she is the best stick-spindle spinner in America!" To which the other visitors agreed.

The girl turned to Miss Addams, "Is that true?" she inquired.

By Underwood & Underwood, N. Y.

The Labor Museum at Hull House

Miss Addams nodded and then went on to explain that the town in Italy from which the mother had come was noted for its expert spinners. She described to the girl the beauty of the town and mentioned how hard it must be for a person to give up all that beauty for a two-room tenement and to give up a beautiful homespun kerchief for an ugly department-store hat. The girl became so interested that when they went home that evening, she allowed her mother to open the big box of homespun garments which had been hidden under the bed, and after that when she came to Hull House on Saturday evening, she came in by the same door as did her mother.

By Ewing Galloway, N. Y.

The milk inspector

At another time Jane Addams was telling about the members of the Garden Club of Hull House. She spoke of them as "Men who are estimated by the bushels an acre of potatoes they had raised, and not by

that flimsy city judgment so often based upon store clothes." These words and her story of the little Italian girl show that Jane Addams did not judge people by the clothes they wore.

In teaching the proper care of clothing and the necessity for clean, neat, suitable clothing, it is sometimes easy to make the kind of clothes seem too important.

Dirty clothing does not necessarily contain disease germs, but the person who wears clean, neat clothing nearly always has other habits of cleanliness and neatness which are closely related to health. It is also true that certain disease germs may be carried in clothing and handkerchiefs, but washing clothing with soap and hot water and ironing it will destroy all disease germs. It is also true that suitable clothing for work and play will prevent accidents. In these ways clothes are directly related to health and safety.

Baby's Health

Not only did these foreign people have to change their habits of dressing when they came to this country, but the very care which their babies required in a city was different from the care sufficient to keep them well in the country districts of Europe. Jane Addams praised the schools for teaching this lesson to the children who, in turn, could teach it to their parents. For example, she tells about one daughter who was such a help to her mother. The poor distracted mother was sure that the reason so

many Chicago babies got sick during their second summer was that they could not have the wholesome goat's milk which European babies usually had.

"No, Mother," said this daughter, "we have learned differently in school. The babies here get sick because the milk is dirty. In Europe the goat's milk was clean because you milked your own goat before your own door, so you knew that it was clean. In America you buy milk from the grocery store after it has been carried for many miles in the country. You can't tell whether it is fit for the baby to drink until the men from the City Hall who have watched it all the way, say that is is all right." Now most States have milk inspection to make sure that milk that is sold has enough butter fat and is free from disease-carrying germs.

Housing Laws

There is no doubt that one group of people in this country is usually ignorant of the living conditions of other groups. The people of Europe, especially England, consider it their duty as citizens to keep themselves well informed of reforms which affect people other than themselves. Jane Addams knew the reason for this difference between Englishmen and Americans. She was interested, therefore, in the following incident.

An Englishman who was a member of the Queen's Cabinet and had a title was visiting in Chicago. Because of his social position in England and because he was an able statesman, he was entertained by

the leading citizens of Chicago. One evening at a large dinner party he turned to the lady sitting beside him and asked:

"Can you tell me the number of cubic feet of air space required by law in this country for each occupant of a tenement-house bedroom?"

The woman had never heard of the subject. "I do not know anything about it," she confessed.

By Ewing Galloway, N. Y.

A model tenement

The Englishman turned to the other guests seated at the long dining table and asked the same question. There was a moment of complete silence, then one of the men spoke up, "How should we know anything about the laws regarding tenement houses!" Another guest said, "I didn't know there was such a thing as tenement-house legislation in this country." All the guests were surprised that the Englishman should expect them to possess such information.

Fortunately we have much better housing conditions than we did during Jane Addams' time. But we still have slums and there is still much to be done in improving living conditions.

Individuality versus Co-operation

Miss Addams had one sad illustration of a person trying to isolate herself from her neighbors and their interests. In the neighborhood of Hull House there lived a widow. She owned a comfortable little house of her own and had lived there for a number of years. Her house was immaculately clean and neat, and she had been able by great sacrifice to send her daughters to college in the east. She was, however, surrounded by overcrowded tenements in a bad state of disrepair. The woman held herself aloof from her neighbors and would never take part in the effort to secure a better code of tenement-house sanitation.

One June when one of her daughters had finished college and the other had two years still to go, they came home to spend the summer holidays with their mother. Typhoid fever had broken out in the neighborhood. In spite of the woman's efforts to keep her own property clean and sanitary, both her daughters fell ill with typhoid fever, and one of them died.

Garbage Collection

"One of the striking features of our neighborhood twenty years ago," wrote Jane Addams in her book about Hull House, "and one to which we never became reconciled* was the presence of huge wooden garbage boxes fastened to the street pavement in which undisturbed refuse accumulated day by day."

By Wide World Photos, Inc., N. Y.

A modern garbage truck

The amount of this refuse may be pictured more vividly if one recalls that there were many fruit peddlers in that part of town, and they filled the garbage boxes with decayed fruits and vegetables. The boxes were also used for the discard of filthy rags which had been fished out of the city dumps and brought to the homes of rag pickers for further sorting and washing.

The children of the neighborhood found it great fun to play in and around these garbage boxes. Babies climbed upon them and they served as forts in battles among the older children. The contents of the boxes made convenient, though filthy, ammunition for these battles. It was a common sight to find children pawing over the contents of the boxes for something to eat. The most conscientious citizen living far away from such filth and odors can hardly be expected to be very persistent in

having them remedied. Miss Addams set out to make the citizens of the ward realize the danger of such conditions. She pointed out to the mothers that if garbage is not properly collected and destroyed, the mother may see her children sicken and die, and that people must not only keep their own houses clean, but must also help the authorities to keep the city clean.

There was another method which she always followed in getting civic improvements started. She began an investigation. In this investigation she wanted to find out whether the efficiency of garbage collections was related to the death rate of the various wards of the city. She found that the death rate was highest in the congested* wards. Then with twelve women she undertook to carefully investigate the condition of the alleys in their own ward. During August and September they reported to the health department 1037 violations of the law.

Certainly great credit is due these women who after washing or ironing all day and cooking a hot evening meal for their families were willing to spend three summer evenings a week walking up and down hot, dirty alleys. They would, no doubt, have much preferred to sit and rest on their own front doorsteps. However, as the result of their activities three city inspectors were transferred from the ward because of unsatisfactory services.

"Still," Miss Addams says, "the death rate remained high, and conditions seemed but little improved." Therefore, she managed to get herself

appointed as inspector of the ward. She got up at six o'clock in the morning to see that the men were early at work. She followed the loaded wagons from which garbage frequently dropped along the way to the dump. She insisted that the man who held the contract for hauling the garbage increase his wagons from nine to seventeen. She took careless landlords into court because they would not provide proper garbage receptacles. She had to arrest one tenant who tried to make the garbage wagons carry away the refuse of his stable. She discovered that the man who was paid by the city to carry away dead animals always made the police ambulance do the work for him.

Finally all her labors were rewarded. The death rate of the ward was found to have dropped from third to seventh among those of the city of Chicago.

Typhoid Fever and Flies

Another investigation carried on by one of the residents at Hull House covered the relation between various systems of plumbing and lack of plumbing to the prevalence of typhoid fever. It was found that where the plumbing system did not shut out flies, these pests had definitely carried typhoid fever from the sewage of one house to the homes of unsuspecting neighbors.

Dangerous Drugs

Miss Addams was also active in trying to prohibit the sale of cocaine to young people. Cocaine is a

colorless, poisonous, habit-forming drug. It is almost unbelievable that Miss Addams found druggists who were willing to make themselves rich by selling this drug to boys and girls, who gradually formed the drug habit and could not get along without the drug in spite of the fact that it was killing them.

She knew one boy who at the age of seventeen died from the effects of cocaine. "He had been in our kindergarten," said Miss Addams, "as a handsome, merry child, in our clubs as a vivacious* boy, and then gradually there was an eclipse of all that was animated* and joyous and promising, and when I last saw him in his coffin it was impossible to connect that haggard, shriveled body with what I had known before."

In spite of many instances like this, druggists wanted to continue the sale of habit-forming drugs, and they felt it was unjust and unfair when a law was finally enacted regulating the sale of cocaine. Such people think so much about their own selfish interests that they fail to consider the welfare of their community.

Evil Effects of Alcohol

Few people have been in a better position than was Jane Addams to note the evil effects of alcohol. Her life brought her constantly in touch with women who had been abused and beaten by drinking husbands and with children who had been neglected by drinking mothers and fathers.

One of her friends was a poor, bedfast* invalid, who lived alone with her grandson in the "second floor back" of a ramshackle tenement. He went to work every morning at seven and, except for occasional visits from kind neighbors or the visiting nurse, the old woman was alone all day.

"Twenty-four years before, when I first knew her," said Miss Addams, "she was the proprietor of the most prosperous second-hand store on a street full of them.

"She had had a shiftless, drinking husband and jolly, good-natured sons, but owing to drink, as the woman herself admitted, the old man, the boys, and the business, too, were gone." There was nobody left but herself and her grandson and nothing for them to live on.

Miss Addams was interested in another investigation of three hundred twenty-eight dance halls. It was found that about 86,000 people patronized these places on Saturday evening. Most of the patrons were boys from sixteen to eighteen years old and girls from fourteen to sixteen years old. These young people were in search of pleasure, the legitimate* right of all young people, but the dance-hall proprietors were in search of money. The easiest way to make money, they well knew, was to sell liquor to the young people. The real purpose of the halls was not to provide a place for the young people to dance, but to provide a place to sell liquor. That the young people easily fell into the net prepared for them is shown by the fact that by

midnight practically all the boys showed signs of intoxication.

In another case Miss Addams knew a very charming Irish woman with three children. Over and over again the husband would desert his wife and children and be gone for a long time, only to return and in a fit of temper sell the household goods and clothing and every possession which the mother worked so hard to buy. It was not until after his death from alcoholism that the capable mother was able to make a comfortable, happy home for her family.

Miss Addams also knew mothers and daughters who became victims of alcohol. She mentions one family in which the father died in a state of insanity brought on by alcohol, the daughter died of contagious skin disease contracted when she was too drunk to realize that she was exposing herself to disease. The mother died soon afterward from the effects of drinking.

At one time when the sale of alcohol was successfully prohibited for a time, Miss Addams noted a great improvement in living conditions. Money that had been spent for drink was used to buy better clothes and furniture. Hours that had been spent in taverns were spent picnicking in the forest reserves or riding into the country or working to earn more money.

During the time when the sale of liquor was successfully prohibited, a large section of the City House of Correction was closed, as was also the

ward for acute alcoholism in the County Hospital. A local drink-cure establishment was closed for lack of business.

"Liquor," says Jane Addams, "is undoubtedly the greatest contributing factor to conditions which involve crime, demoralization, immorality, bombing, murders, racketeering, and other unlawful practices."

"Many girls," she goes on to say, "are afraid to drive with men who carry hip flasks. Automobile accidents are multiplied, not only by the man who is intoxicated but even more by the man whose few drinks have made him recklessly eager to take chances and have evoked* within him a daredevil courage."

Civic Co-operation

In almost everything she tried to accomplish, Miss Addams worked with civic organizations. She realized how true it is that one person working alone can only begin a task; he must have the help of others and be himself a helper if the task is to be carried on. Thus she worked with the State Board of Charities, the Board of Health, the Public Library Board, the Juvenile Protection Association, the Board of Education and many other groups by whom the progress of our country is being carried on.

She never became indifferent to the needs of those around her. A famous Russian once said of Moscow, "Wherever we may live, if we draw a circle around us of a hundred thousand, or even a thousand miles in circumference, and look at the

lives of those men and women who are inside our circle, we shall find half-starved children, old people, sick and weak persons working beyond their strength who have neither food nor rest enough to support them, and who for this reason die before their time; we shall see others, full grown, who are injured and needlessly killed by dangerous and hurtful tasks."

This was a challenge to Jane Addams. It should be a challenge to everyone today. Everyone should try to help others to have the privileges of clean, nourishing food, wholesome exercise, and the opportunity for relaxation. Sanitary living and working conditions, freedom from overwork, strength of character to resist alcoholic drinks and habit-forming drugs, safety and freedom from disease should be the ambition of every person.

★ The International Health Board

The International Health Board is one of the major divisions of the Rockefeller Foundation of New York City. Founded by the late John D. Rockefeller, it is spending hundreds of millions each year to carry its public health campaign to far-flung corners of the world. This work is being conducted in hospitals, universities, clinics, and laboratories, as well as through scientific expeditions in the disease-infested areas.

To know how the International Health Board started, the pages of medical history must be thumbed back to 1909. The scene is the Southern States. In the country districts thousands were

The individual can do little; co-operation much

victims of a strange disease caused by the hookworm. This little pest is no respecter of persons. It attacks young and old, the white and the colored.

The seriousness of the condition was brought to the attention of Mr. Rockefeller, and soon the Rockefeller Sanitary Commission was started to stamp out the disease. By 1914, when the Commission withdrew to permit the county health officers to complete their work, the hookworm was well under control.

So satisfied was Mr. Rockefeller with the results accomplished, that he arranged an initial endowment of $100,000,000 for the Foundation. It was incorporated for the purpose of "promoting the well-being

of mankind throughout the world." In considering the program of activities, the trustees, of which John D. Rockefeller, Jr., was chairman, asked the advice of the scientists of the Sanitary Commission. They suggested that world-wide public-health work and medical instruction be conducted along the lines of the anti-hookworm campaign so successful in the Southern States. To this the trustees agreed.

The Rockefeller Sanitary Commission was reorganized. It was incorporated as the International Health Commission. Since 1916 it has been known as the International Health Board. Trained workers were sent to twenty-one foreign states and countries where the hookworm was menacing the lives of millions. Today that little pest finds few welcoming regions, thanks to the aid of the Board.

Another outstanding work was the intensive campaigns against yellow fever. When the Panama Canal was opened in 1915, the Canal Zone had been cleaned up. The deadly mosquito which carried the germ was exterminated. However, it was feared that ships going through the Canal and stopping at infected ports might carry the germ to the densely populated Oriental centers and thence on around the world. Again Mr. Rockefeller came to the rescue. A special Yellow Fever Commission was organized, with General William C. Gorgas as director. He was especially qualified for the job, for he had headed the effective work against this terrible menace in the Canal Zone.

The first yellow-fever survey was made in Guatemala in 1918. Within a few months the disease had practically disappeared in that country. The public health campaign then was continued in South America and north through Central America and Mexico. Today, except for occasional outbreaks, easily combated, yellow fever has disappeared from those lands. In each case the Foundation co-operated with the various governments.

In our own country, through the help of this great division of the Rockefeller Foundation, standards of health and living have been raised in many States. In thirteen States malaria has been reduced because the authorities have been taught how, in the least expensive way, to destroy the breeding places of the mosquito which carries the germ. In regions where the prevention of tuberculosis was neglected, surveys have been made. Persons infected with the disease have been reported to the health officers.

The International Health Board together with the League of Red Cross Societies and the League of Nations are the three great agencies which have played the leading part in promoting health progress on a vast, international scale.

Things to Do

1. Find out what kind of living conditions exist in different parts of the city or county in which you live and tell your class about them. Discuss with your classmates and teachers how bad living conditions can be improved.

2. If you live in the country, draw pictures of a farm which has healthful living conditions and of a farm in which the living conditions are not healthful.

3. Tell the class what you do to help keep healthful living conditions around your home.

4. Find out what is done in some factory to have healthful and sanitary working conditions, and report this to your class.

5. Make a list of the days in which garbage is collected at your house, and hang it by the garbage pail so that you can be sure it is emptied when it should be.

6. Write a list of things you can do to help make and keep your home and community clean.

★ 7. Ask someone you know about the laws regarding tenement houses in the city in which you live, and tell your class about them.

What Do You Do?

Just to know what to do will not make you strong and healthy. To be strong and healthy you must do the things you know you should do. Here are some questions about what to do:

1. What would you do if a person received a bad bruise?

2. What do you do to prevent getting burned?

3. What do you do to prevent becoming sunburned?

4. When you feel faint do you always lie down?

5. What do you do to prevent your family from being poisoned?

6. Do you always sleep in a well-ventilated bedroom?

7. Do you depend on your diet and exercise or on a laxative to have a bowel movement each day?

8. Do you wash your hands and face before every meal?

9. Do you have two warm, soapy baths every week?

10. Do you brush your teeth at least twice every day?

11. Do you always carry a clean handkerchief?

12. Do you change your underclothing at least twice a week?

13. Do you wash your hair regularly?

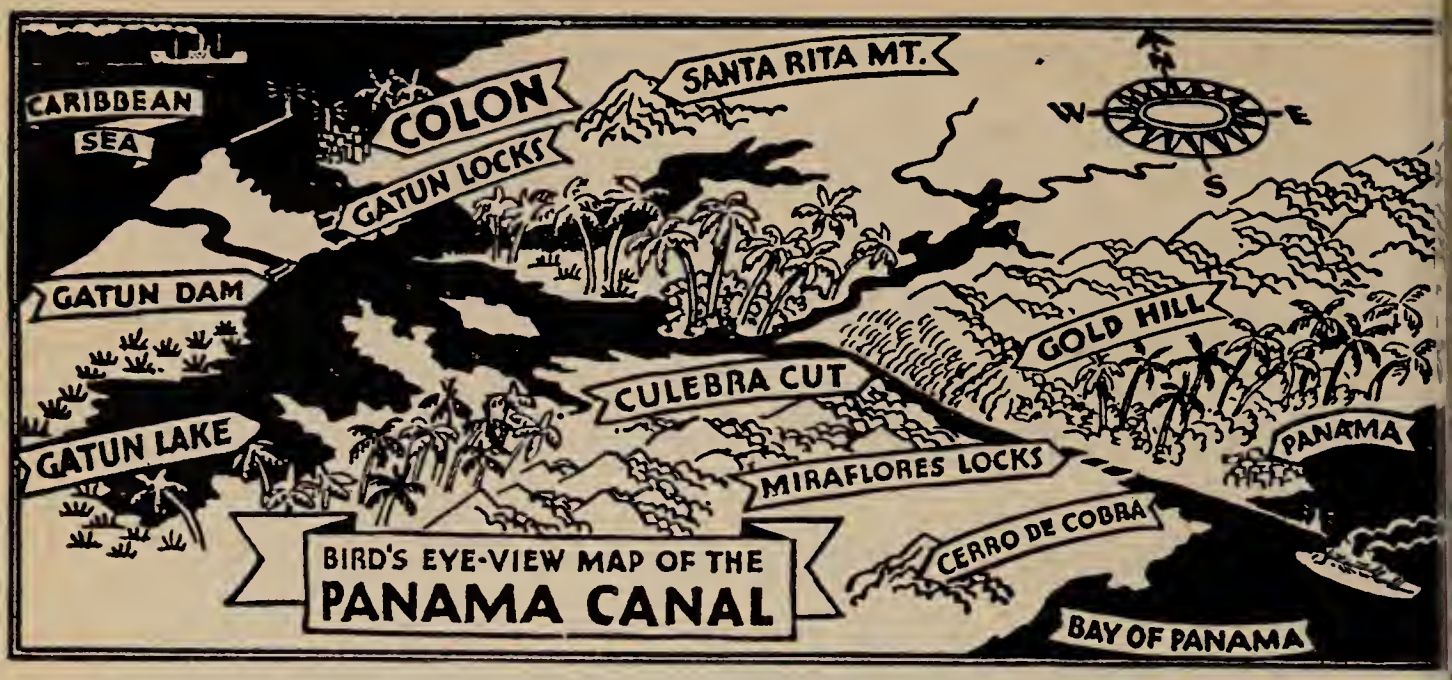
14. Do you clean your fingernails every day?

15. Do you help keep the streets, passageways, and alleyways in your neighborhood clean and neat?

16. Do you know whether conditions of work in any of the factories in your community are either unsafe or unhealthful?

17. Do you have a sanitary garbage container for your home?

18. Are there any places of business in your community that sell intoxicating liquors, tobacco, or harmful drugs to children and young people in your community?



CHAPTER IX

Preventing Disease

In Danger

"Boom! Boom!" came the sound of distant cannon, accompanied by the "Bang! Bang! Bang!" of smaller guns.

A young boy pressed his face closer against the living-room window. He could see the smoke and flame of burning buildings as the soldiers set fire to one after another of the houses of Richmond. He kept his eyes anxiously on a certain building. He hardly moved. A younger sister came and stood for a minute beside the boy, then she turned away in terror. "Oh, Willie, I'm afraid," she said. The boy drew himself up as tall as possible, but he kept watching the building.

"Don't be afraid," he said, "I am going to take care of all of you just as Father told me to do."

"Where is Father?" whispered the girl.

"I don't know," answered Willie. "He had to leave so he wouldn't be captured by the enemy, and he told me to take care of you and Mother and the little girls. He said, 'When that building over there catches fire,' " said he, pointing to the building he had been watching intently, " 'you are to take the cow and lead the way, and you are all to go to Uncle Thomas's.' "

Willie was hardly through speaking when flames burst from the building he had just indicated. He hurried to carry out his father's orders. Soon a strange procession left the house. William led the way, holding firmly to the cow's halter. His mother followed, carrying the baby. The four little sisters were clinging to her skirts.

In all the noise and confusion the frightened cow was difficult to manage, but William held persistently* to the halter until the cow was hit by an exploding shell. She plunged forward, and because he did not let go the halter the boy was thrown to the pavement and knocked almost unconscious. The cow disappeared forever. William wept bitterly and refused to be comforted. He and his mother and sisters finally reached Uncle Thomas's. Later they went on to Baltimore where they remained until the end of the war and the return of their father.

William Plans His Life's Work

The same determination which caused the boy, William Gorgas, to try so hard to carry out his

father's orders showed itself in every important event of his life. While still a boy, he decided, as so many boys do, that when he grew up he was going to be a soldier. He was frank, cheery, smiling, and good-natured. He enjoyed swimming, boating, hunting, and baseball. He had a donkey on which he spent many happy hours, but most of all he was interested in soldiers. He was devoted to any man who could tell him about battles or any book which contained stories about the brave deeds of soldiers.

As he grew up, he kept most of these interests. By the time he finished college he was a stalwart* and handsome man of twenty-one. In college he had been the best player on his baseball team. He was an excellent swimmer and had been able to save more than one life. He enjoyed fishing and hunting and riding horseback.

"He invariably talked in subdued tones," says one story of his life. "He seldom showed excitement, yet the persistence and determination that afterward became his most conspicuous qualities were already familiar to his friends."

About one thing he was most persistent. He was going to join the army. He tried for West Point, but he had not lived long enough in one place to be accepted as a candidate for West Point. Therefore, he determined to go to school so that he could be taken into the army as a doctor. During his years in medical school in New York City, he took a daily swim and spent many hours rowing on the Hudson River to keep himself physically fit. As soon as he

had finished his training, he entered the medical department of the United States Army.

Now it turned out that by entering the Army as a doctor, William Gorgas became, after several years, director of two of the most important campaigns ever conducted by the United States Army. In order to realize the value of his work to the people of the United States and of the world, it is necessary to understand how terrible an epidemic of yellow fever could be, how malaria could destroy whole civilizations, and how susceptible Negroes could be to pneumonia.*

A Horrible Disease

It is hard to imagine the terror which yellow fever caused. In one house two or three people might be sick, and those who were with them constantly might not get sick. Many others who had not been near a case of yellow fever might suddenly be stricken. Within a week after a person was taken sick he was either dead or well on the way to recovery. Funerals were often held at midnight, and even the dead person's family kept away from the services. An appalling* number of cases died. In no other epidemic disease is the death rate so high. The number of deaths during an epidemic of yellow fever is almost unbelievable. In 1800 Napoleon sent 25,000 picked men to Haiti; in 1803 there were only 3,000 men left to evacuate* the island; 22,000 had died. The defeat of Napoleon's men is usually attributed to the native leader, Toussaint l'Ouverture,

By Brown Brothers, N. Y.

Soldiers cleaning up Havana

but the real enemy of the French troops was the virus* of yellow fever. The natives who had always lived in the presence of yellow fever had acquired* a resistance to the disease. The French had not acquired such immunity. *

Up until about 1910 most of our ports were subject to epidemics of yellow fever, more or less serious. New York, New Orleans, Philadelphia, and Memphis had suffered from serious epidemics of the disease. Therefore, after the Spanish-American War in 1898, it was well known that although the Americans had driven the Spanish out of Cuba, the Americans might themselves be driven out much more completely and permanently unless some way was discovered to combat yellow fever. But how could the disease be prevented when one did not know the cause of it?

The Cause of Yellow Fever

Various strange explanations were given as the cause of yellow fever. Some said it spread by

poisonous gases, by swamp miasma* (infectious material), by fermentation,* by dry particles of dust or decaying, putrefying* vegetable matter. Of two things scientists were sure; first, that where filth existed there was always disease, and second, that Havana, Cuba, was one of the filthiest cities in the world. Therefore, William Gorgas, who was by now a General in the United States Army, was given complete authority to clean up Havana. The governor of Cuba was General Leonard Wood, also a doctor, who gave Gorgas all possible help and encouragement. The story of the scrubbing, white-washing, plumbing, drainage, and general cleaning up that took place in Havana is too long to repeat here. Not a home, office, or place where food was sold was overlooked. Stables were supplied with new cement floors. The milk supply was inspected and improved. Garbage was properly disposed of, and people were taught the need and value of chlorinated* lime as a deodorant* and disinfectant.*

What was the result? The general death rate of Havana declined rapidly. Community cleanliness could wipe out such diseases as typhoid, dysentery,

Common mosquito Malaria mosquito Yellow-fever mosquito

Three kinds of mosquito

and others, but it had no effect upon yellow fever. Deaths from yellow fever began to increase. It was very disheartening to Gorgas and his assistants who had worked so hard

Then the Surgeon General of the United States Army appointed a special commission to study the cause of yellow fever. At the head of the commission was Dr. Walter Reed. Other doctors had been performing experiments trying to prove that yellow fever is carried by a mosquito, but their work was not complete. It remained for Reed and his group to choose the true and discard the false in the work of others and add their own clear-cut experiments by which in less than six months they had proved that yellow fever is carried by a certain mosquito. This mosquito is generally called the *Stegomyia.*

Wiping Out Yellow Fever in Habana

When Gorgas heard of Reed's work, he said, "If yellow fever is carried by a mosquito, then I am going to get rid of the mosquito."

Reed smiled. "It can't be done, he said.

Indeed, most people when the cause of yellow fever was known, felt more certain than ever that the disease could never be wiped out. In and around Habana there were countless billions of mosquitoes. How could anyone hope to get rid of them all?

Perseverance was one of Gorgas's strongest characteristics. He set out to rid Habana of yellow fever, and he did not stop until he had accomplished

By Underwood & Underwood, N. Y.

A street in modern Havana

this. He began work in March, 1901. There were five deaths in July and August of that year. In 1905 there was another outbreak of the disease which was promptly checked. Since that time there has not been a case of the disease which used to cause more than five hundred deaths a day.

The boy who had wanted so much to become a soldier had won his first great battle. He had not only defeated the enemy, he had completely wiped it out, and he had begun a great war by which he was finally able to win for civilization enormous tracts of tropical country where people had never before been able to live in health and security.

Wiping Out Yellow Fever in Panama

The next campaign of this war against yellow fever was carried on in Panama, that narrow strip of land which connects North and South America. On one side is the Atlantic Ocean and on the other the Pacific Ocean. It was recognized that a canal across Panama would mean a great saving of time and money to ships passing from one ocean to the other.

The French had tried to build such a canal, but had failed because so many of their men—sometimes 500 a day— had died of yellow fever. After trying bravely and courageously for ten years, the French were finally driven out of Panama by disease. For several years nothing was done about a canal. Then, at the time Gorgas was making his spectacular* sanitary drive in Havana, the United States took a renewed interest in Panama. In 1903 they bought the French rights to build a canal and concluded a treaty with the Republic of Panama guaranteeing a right of way. Because of Gorgas' success in Havana, he was put in command of the war against disease in Panama.

In no other place in the world was there so much filth and disease. The heavy jungle foliage of Panama held heat and dampness. There were clouds of mosquitoes during the rainy season. Snakes, alligators, scorpions, and centipedes infested the place, but these caused much less terror than the constant sickness. Panama was a pest hole of tropical diseases. People coming to live there often

brought their coffins with them. Sometimes a ship lying in one of the harbors would not have a living person aboard, all the crew having died of yellow fever. During the time the French were trying to build the canal, there was an almost constant succession of funerals. It was very depressing. People lived in constant fear and dread. One Frenchman spent a large sum of money to build himself a home, but before the house was finished his wife, son, and daughter had died of yellow fever. Both officials and laborers of the French Canal Company were afraid to bring their wives and children to such a dangerous place, so there was very little happy home life. There were no entertainments. Sickness and death were everywhere.

Gorgas changed all this. How did he do it? First he screened all buildings inhabited by people. He waged war on all insect pests, rats, vermin,* and poisonous snakes. He cleaned up the cities in the most approved sanitary manner, including proper collection and disposal of garbage and refuse. He established hospitals and sanitariums. He caused hospital cars to be attached to the trains passing across the isthmus. He drained swamps and established safe water and food supplies. He observed the strictest inspection and quarantine of all vessels which came into port. He cleared away underbrush. He made it illegal to sell alcoholic beverages.

Of course, it was not easy to do all this. There were people who disapproved his methods. Some thought he was too particular. One young architect,

By The Panama Canal

A Panama street when the Canal was started

when told by a sanitary officer to see immediately to the screening of an office building where three hundred men worked, replied, "Oh, officer, you are off in the upper story."

"Suppose we have twenty deaths here," replied the officer, "Who will be responsible?"

"I'll stand the responsibility," replied the young architect gaily.

A month after this conversation the young gentleman was dead from yellow fever. The disease had broken out in his own office and he was the first victim.

By The Panama Canal

The same street as Gorgas left it

The Cost of Disease

Some people thought Gorgas was spending too much money. The engineer in charge of building the canal once said to him, "Do you know, Gorgas, that every mosquito you kill costs the United States Government ten dollars?"

"But just think," replied Gorgas to the head engineer, "One of those ten-dollar mosquitoes might bite you, and what a loss that would be to the country!"

Indeed, the French had spent 40,000 men and $250,000,000 and had failed. Had the sickness rate

of the French prevailed when the Americans were at work, we should have had about 13,000 men in the hospitals all the time, and had the French death rate prevailed we should have lost not far from 35,000 lives. This would have cost considerably more than Gorgas was spending to prevent such sickness and death. It would probably have made the construction of the canal as impossible for us as it had been for the French. In reality Gorgas with his health measures was saving money for the people of the United States. But many persons, like the engineer, think of money spent for sanitation (preservation of health) as benefiting someone else. They do not realize that it may be saving their own lives.

Preventing Malaria

While yellow fever terrified people because it hit unexpectedly and killed quickly, another tropical disease was doing much damage without frightening people so much. This other disease was malaria. Like yellow fever, malaria is carried from one person to another by the bite of a mosquito. The Stegomyia carries yellow fever. The Anopheles carries malaria. But when a person has recovered from one attack of yellow fever he is immune for the rest of his life. In this way the natives of a city like Havana or a country like Panama become immune, and yellow-fever epidemics occur only among outsiders who come to the place.

On the other hand a person may have any number of attacks of malaria and, although malaria does not

By The Panama Canal

A concrete mosquito ditch in Panama

kill as yellow fever does, it greatly reduces a person's strength and vigor. When malaria has prevailed in a country for a long period of years, so many citizens become weak that the whole country shows lack of strength and vitality. After all, a country is no stronger than its individual citizens. Malaria was one of the important causes of the downfall of the Greek and Roman civilizations. For hundreds of years malaria sapped the vitality of people living in the Mediterranean countries until they were no longer able to defend themselves against invading enemies. Those countries which had for centuries

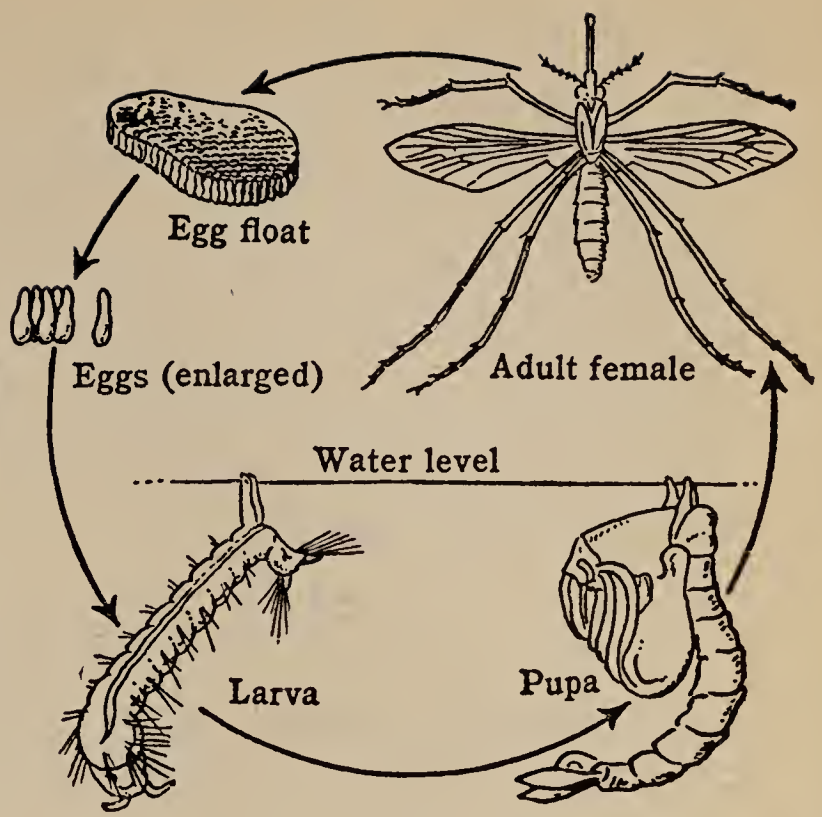
produced the world's best art, literature, architecture, and government moved backward almost to barbarism.

Malaria is still prevalent* in some of the southern States of this country. Only the combined efforts of citizens and health officers will ever stamp it out. Gorgas pointed the way when he cleaned up Havana. He was not quite so successful in his campaign against malaria in Panama as he had been in his campaign against yellow fever because the authorities felt that building concrete ditches and draining swamps and ponds were engineering problems. These were, therefore, taken out of Gorgas' hands and put in the hands of engineers. The work was not so thoroughly and completely done as Gorgas would have done it. This was always a source of disappointment to him, similar to the feeling he had when as a small boy he lost the family cow and was therefore unable to complete something he had set out to do.

In spite of his handicaps, Gorgas' warfare on the Anopheles was wonderfully successful. In 1906 forty per cent of the canal workers were admitted each month to the malarial wards of the hospitals. By 1913 this number had been reduced to ten per cent.

To understand Gorgas' methods, one must first understand some of the habits of the mosquito. During its lifetime the mosquito passes through four stages. First, it is an egg which the adult mosquito has laid upon the surface of quiet water.

The yellow-fever mosquito prefers containers of clean water in or near dwellings. The malaria mosquito prefers quiet, stagnant water. The egg hatches into a larva,* or "wiggle-tail," which lives and moves around in the water but must come to the surface every two or three minutes for air. The next stage, the pupa* stage, is spent near the surface of the water, and at the end of that stage the cocoon-like pupa splits open and an adult mosquito comes out.



Life cycle of the mosquito

Gorgas found that the most effective time to destroy mosquitoes is during the larva and pupa stages. He put large numbers of fish into the streams and ponds of Panama because fish eat mosquito larvae. Wherever possible, he destroyed the marshes and ponds where mosquitoes laid their eggs. When this was not possible, he poured a thin film of kerosene or crude oil on the surface of all quiet water. This prevented the larvae and pupae from breathing and destroyed them. Gorgas found that the Anopheles mosquito is unable to endure strong sunlight and is easily destroyed by

strong wind. Therefore, he cleared out tall grass and dense jungle undergrowth. To fight full-grown mosquitoes, he also used screens and fumigation. Fumigation means filling a place, such as a room or building or boat, with poisonous gas. This method is used in destroying mosquitoes, rats, fleas, and lice which may carry disease. It is not effective in destroying germs. Germicides or disinfectants are used to destroy germs.

Fighting Pneumonia

Besides his successful campaigns against yellow fever and malaria in Panama, Gorgas waged another successful campaign against pneumonia. At the beginning of the building of the canal, pneumonia broke out among the colored workmen and they died at an appalling rate. This disease was as strange to them as yellow fever was to the white men. They had therefore built up no resistance to it. When they came to Panama to work, they were housed in

By Ewing Galloway, N. Y.

Health official dipping mosquito larvae

wretched buildings which had been left by the French. Crude wooden bunks (beds) were built like platforms along the walls of these buildings. Upon these the colored workers slept, crowded as closely together as possible. They were too poor to afford more than one set of clothing. After working in the rain they had to sleep in their wet garments in the unheated shacks. Under these conditions one case of pneumonia was soon spread to an entire group. More Negroes died from pneumonia than from all other causes combined.

What did Gorgas do? He had a large tract of government land set apart. Here the Negroes were encouraged to build their own cabins at a safe distance from one another. These cabins were roomy and neat. To them the Negroes brought their wives and children, and a contented, prosperous community took the place of the wretched huts. Single cases of pneumonia were immediately sent to hospitals, and pneumonia epidemics were completely conquered.

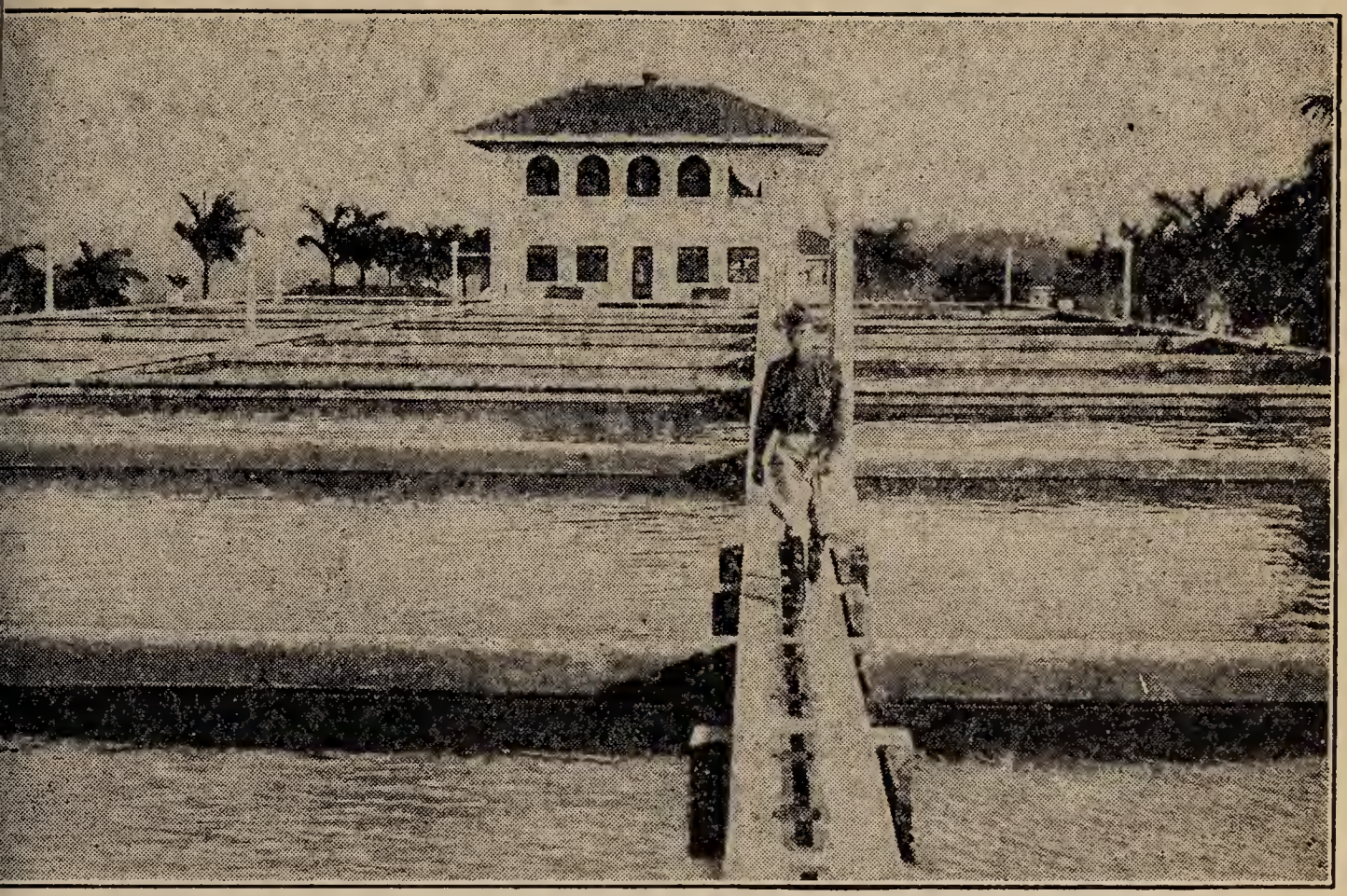
Thus, in a methodical, efficient, and determined way, Gorgas fought and destroyed one after another of the diseases which had driven out the French and which had given Panama the name of being the unhealthiest spot in the world. The death rate at Panama now became lower than that of any American city or State. From the unhealthiest, it had become the healthiest spot in the world. Colonel Gorgas had won his war. "Gorgas' work is the greatest sanitary achievement the world has ever seen," said a famous Englishman.

Other Work of Gorgas

Honors were bestowed upon Gorgas everywhere he went. He was given honorary degrees by the University of Pennsylvania, Harvard, Brown, the University of the South, and Johns Hopkins in this country and by Oxford University in England. He became a Major General in the United States Army, and during the World War he was Surgeon General. In his care of United States troops, Gorgas made use of every known measure to prevent sickness, such as vaccination against typhoid and paratyphoid* and smallpox, antitoxin for diphtheria and tetanus.* He recommended suitable and sufficient clothing for the men, and ample air space in the barracks to insure proper ventilation. He urged exercise and recreational sports to keep the men fit.

He was also put at the head of the International Health Board. Pasteur, Lister, Koch and their co-workers had clearly shown that people do not have to have contagious diseases. If they do have them, it is because they lack the intelligence or the means to help themselves. As head of the International Health Board Gorgas set out first to free the world of yellow fever.

He had practically succeeded in this when he was called to Africa. On the way to Africa he stopped in Europe. He was entertained by the King of Belgium and then went to England where he was to have an audience with the King of England. But soon after arriving in England Gorgas was taken sick. He was removed to an English military



By Underwood & Underwood, N. Y.

The Miraflores Reservoir, Panama

hospital where Mrs. Gorgas visited him every day. One day when she arrived at the hospital she sensed a new excitement in the air. A nurse called her aside and said, "Will you tell General Gorgas that we are expecting the King at any moment?"

Upon hearing that Gorgas was ill the King had said to Sir John Goodwin, "If General Gorgas is too ill to come to the palace to see me, I shall go to the hospital to see him."

And so King George V, attended by several English gentlemen, arrived at the hospital. After visiting a while with Doctor Gorgas, the King took from his equerry* the insignia* of Knight Commander of the Most Distinguished Order of St. Michael and St.

George, and presented it with the following words: "General Gorgas, it gives me very great pleasure to present you with the insignia of this order; and believe me, I very sincerely appreciate the great work which you have done for humanity—work in which I take the greatest interest." It was appropriate that Gorgas should be thus knighted by a king, for certainly no legendary knight ever earned his title by more gallant deeds for the lasting good of humanity.

Carrying on Gorgas' Work

As a direct result of Gorgas' methods, yellow fever has been completely wiped out of this country. In fact, yellow fever epidemics are rare in any part of the Western Hemisphere. The same achievement is possible with every communicable disease! All that is needed is perfect co-operation between citizens and health authorities. Gorgas' work should be continued. Some communicable diseases which still are found in this country could be wiped out with much less effort than it took to wipe out yellow fever. Smallpox and diphtheria are two good examples.

How Diphtheria and Smallpox Can Be Eliminated

If every susceptible person in this country went immediately to his doctor or health officer to be made immune to diphtheria, in six months that dreadful disease would be as rare as yellow fever. How can

a person know whether or not he is susceptible? A doctor can easily find that out by using the Schick test. The Schick test is a simple puncture of the skin. With this puncture a bit of special substance is injected into the skin. If the person is susceptible to diphtheria, a small red spot will appear around the puncture. It will not hurt or be sore and it will soon disappear, but it will show that that person should be made immune to diphtheria, or else he will probably get it if he is ever exposed.

Making a person immune is like giving him the Schick test, except that it consists of two or three punctures instead of one. Three months after the last puncture, or *inoculation*, as it is called, another Schick test should be made to be sure that the immunity is established. Once established, the immunity will usually last a lifetime. Every baby should be made immune to diphtheria as soon as it is six months old, because diphtheria is one of the principal causes of death in children from one to six years old.

Does it cost anything to be made immune to diphtheria? Yes, it costs something to produce a clean, safe vaccine, and the doctors' and nurses' time is worth something, but the cost of these is nothing compared to the cost of having diphtheria. A plan can always be worked out for people who cannot afford to pay for the treatment. In some communities the cost is paid from the tax money.

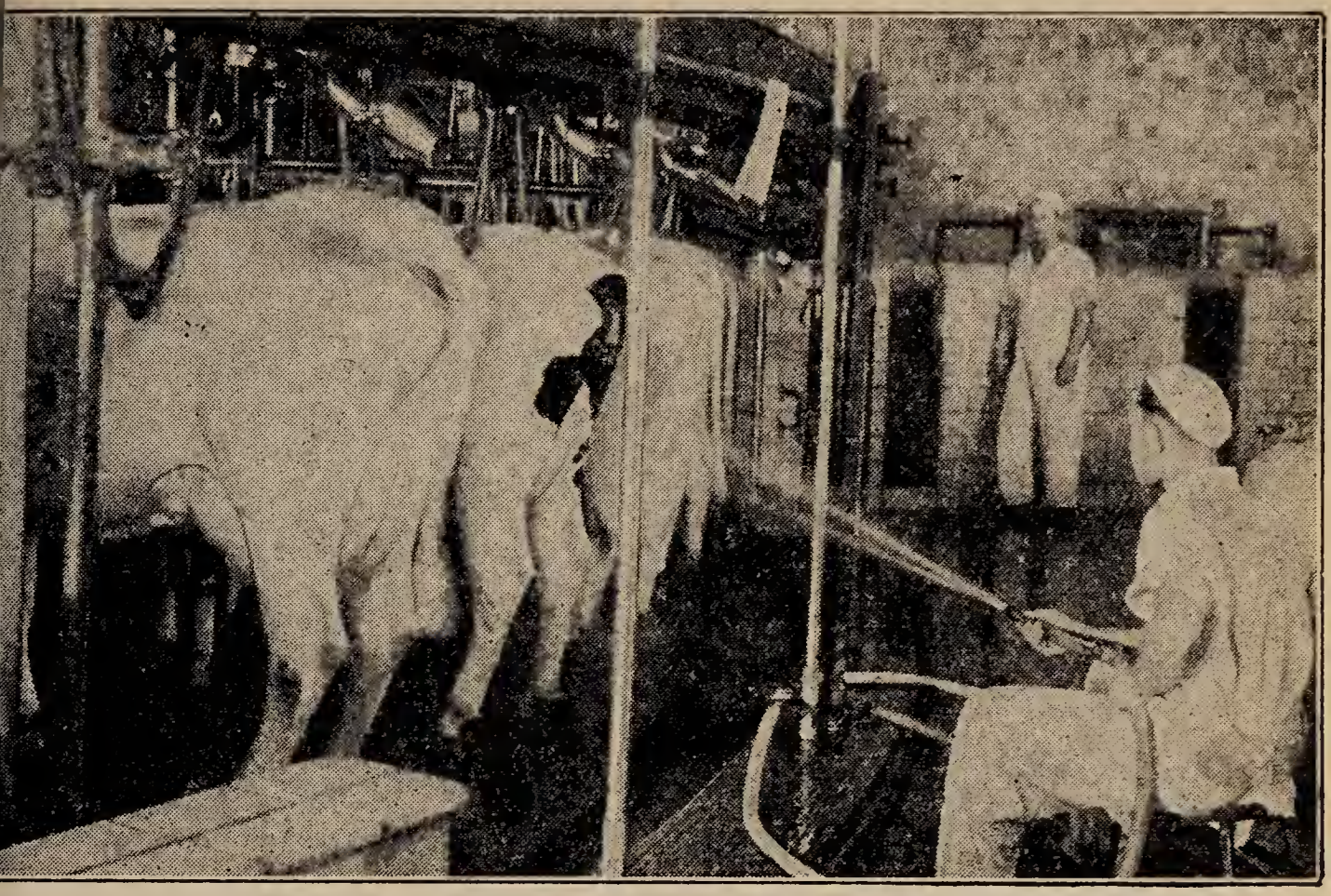
Smallpox is another communicable disease which could be wiped out just as simply and surely as

diphtheria. To do this every baby should be vaccinated when he is six months old. He should be vaccinated a second time, usually before entering school. After that it is necessary to be re-vaccinated only when there is an epidemic or when he has been exposed to smallpox. People who have never had a vaccination which "took" should keep on being vaccinated until they have a "take." It is rare for a person who has had two successful vaccinations to get smallpox. In the few cases where this has happened the person was usually not very sick.

Wiping Out Typhoid Fever

Typhoid fever is another communicable disease which Gorgas fought successfully. It can be prevented in two ways. There is a vaccine which will make a person immune to typhoid fever for about two years. Since its action is so short it is used only during epidemics or when the water supply has been contaminated by floods or other disaster, or when a person is likely to be exposed to typhoid fever, as when traveling in foreign countries or even in some parts of this country. By inoculating all soldiers against typhoid fever in the army, this disease has been reduced from 594 cases with 78 deaths per 100,000 in 1901 to 7 cases with 1 death in 1933.

Since the germs of typhoid fever are most often carried in food and water and milk, another method of preventing this disease is by proper care of food, water, and milk. National, State, and city or county



By Ewing Galloway, N. Y.

These cows are washed before milking

health officers are doing a splendid piece of work inspecting and protecting the milk, food, and public water supplies all over this country. The responsibility for safe, clean food also rests upon every person who handles food from the time it is produced until it is eaten. The water and fertilizers used in a garden should be free from contamination. Food should never be stored in moist, dark, damp places where germs breed easily. It should be protected from rats, mice, cockroaches, flies and other animals and insects which carry diseases. It should be handled only by clean, healthy persons. Very special care is necessary in cleaning and preparing food for the table. Sometimes a person who has

had typhoid and recovered continues to harbor the bacteria in his bladder or intestines for months or even years. Such a person is called a "typhoid carrier." A "typhoid carrier" should never be allowed to handle food which other people are going to eat.

Proper care of milk is very important in the prevention of typhoid as well as other diseases. Milk should come only from clean, healthy cows. It should be milked into clean pails, strained, and quickly cooled. The people who do the milking and handle milk and milk utensils should be clean and healthy. Milk and milk products which have been properly pasteurized and kept clean and cool after pasteurization are free from disease germs.

Although typhoid germs do not breed in dirty back yards or rubbish piles or filthy vacant lots, it is true that when a community is cleaned up as Gorgas cleaned up Havana and Panama, the typhoid rate is immediately lowered. The condition of alleys, streets, yards and vacant lots indicates the cleanliness and sanitary habits of the people who live there. Where filth is, there are also flies, rats, and vermin, and disease. Disease is expensive, therefore cleanliness saves money.

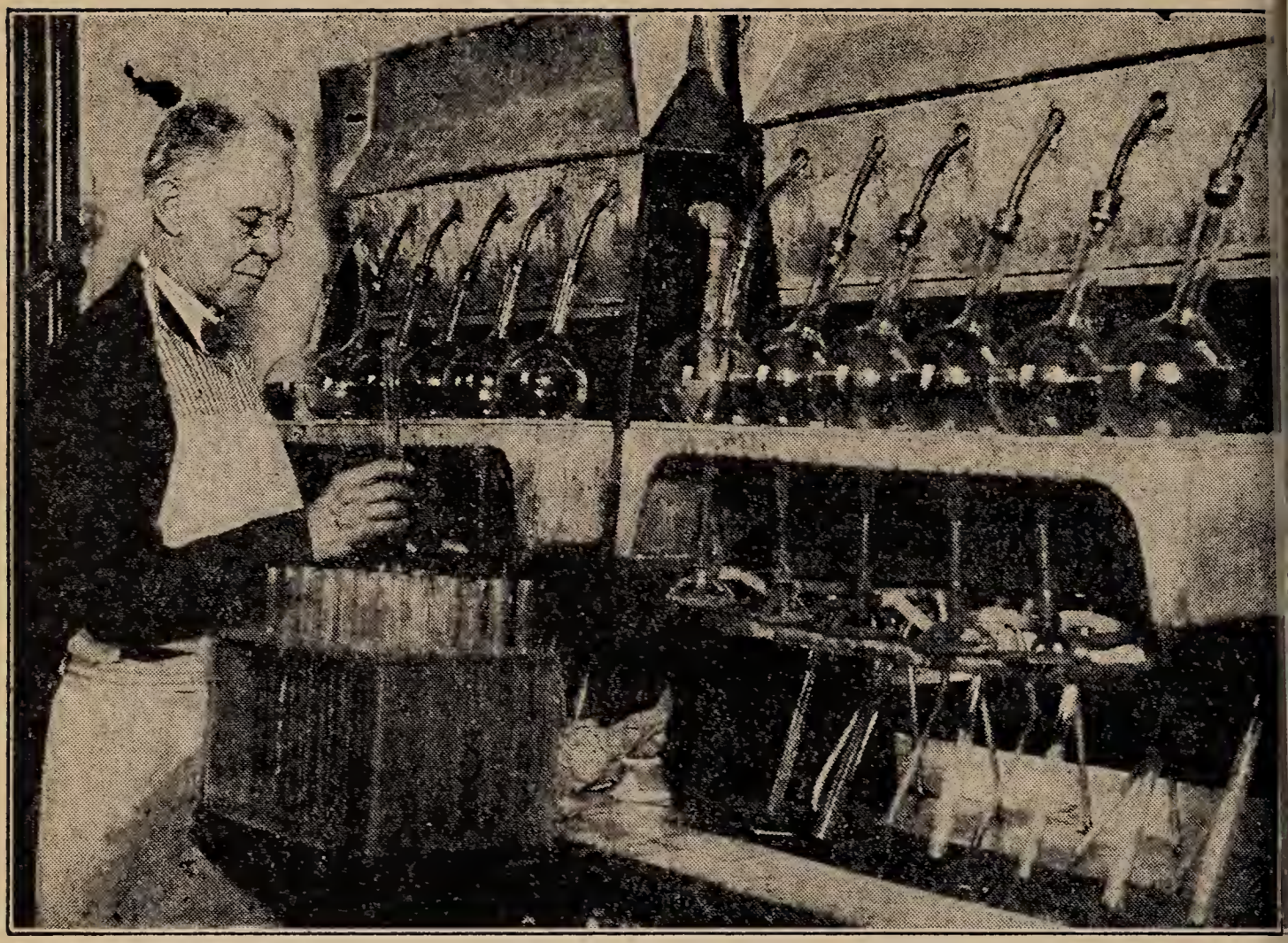
A clean city is one where the cellars, garrets, and alleys are free from refuse, where empty lots and back yards are planted with grass, trees, or flowers, where stables, wharves, and markets are free from rats and rubbish. Visitors to Havana will almost always remark, "Havana is such a clean, beautiful city."

That is because for almost forty years the health officers and citizens have carried on the sanitary methods which Gorgas started. The inhabitants of cities usually co-operate with one another to assure themselves of a clean, safe water supply, food inspection, sewage, garbage, and refuse disposal. These sanitary measures are more difficult to carry out in smaller towns and country communities, and it is in these places that we find a larger percentage of deaths from preventable diseases.

Water Supply

The business of providing a public water supply is complicated.* First of all, the source of the water —wells, lakes, or streams—must be free from contamination if possible. If they are not free from contamination, the water must be filtered through beds of sand or purified in some other way. The source of water and places where it is stored must be inspected frequently. The water must also be analyzed* to determine its quality and the presence of bacteria. To destroy any bacteria which may be present in water, liquid chlorine is usually added to the water. The amount of chlorine added is too small to injure people, but a small amount of it will destroy large numbers of bacteria.

In some places water is inspected and analyzed several times a year, in other places several times a month. Some large cities have their water analyzed every hour. In case of very hot weather, floods, or epidemics, these examinations must be made even



By Ewing Galloway, N. Y.

A city water-testing laboratory

more frequently. The person who has to watch the purity of a water supply must be well trained and conscientious, for he is responsible for the health of many people. He should not be like the young architect in Gorgas' story.

Figures have been gathered which show that a community water supply is not only less likely to be contaminated than individual supplies, but it is much less expensive. The only way to be sure of a safe water supply in the country is by proper location and construction of a well and by use of the facilities of the State or county Board of Health in

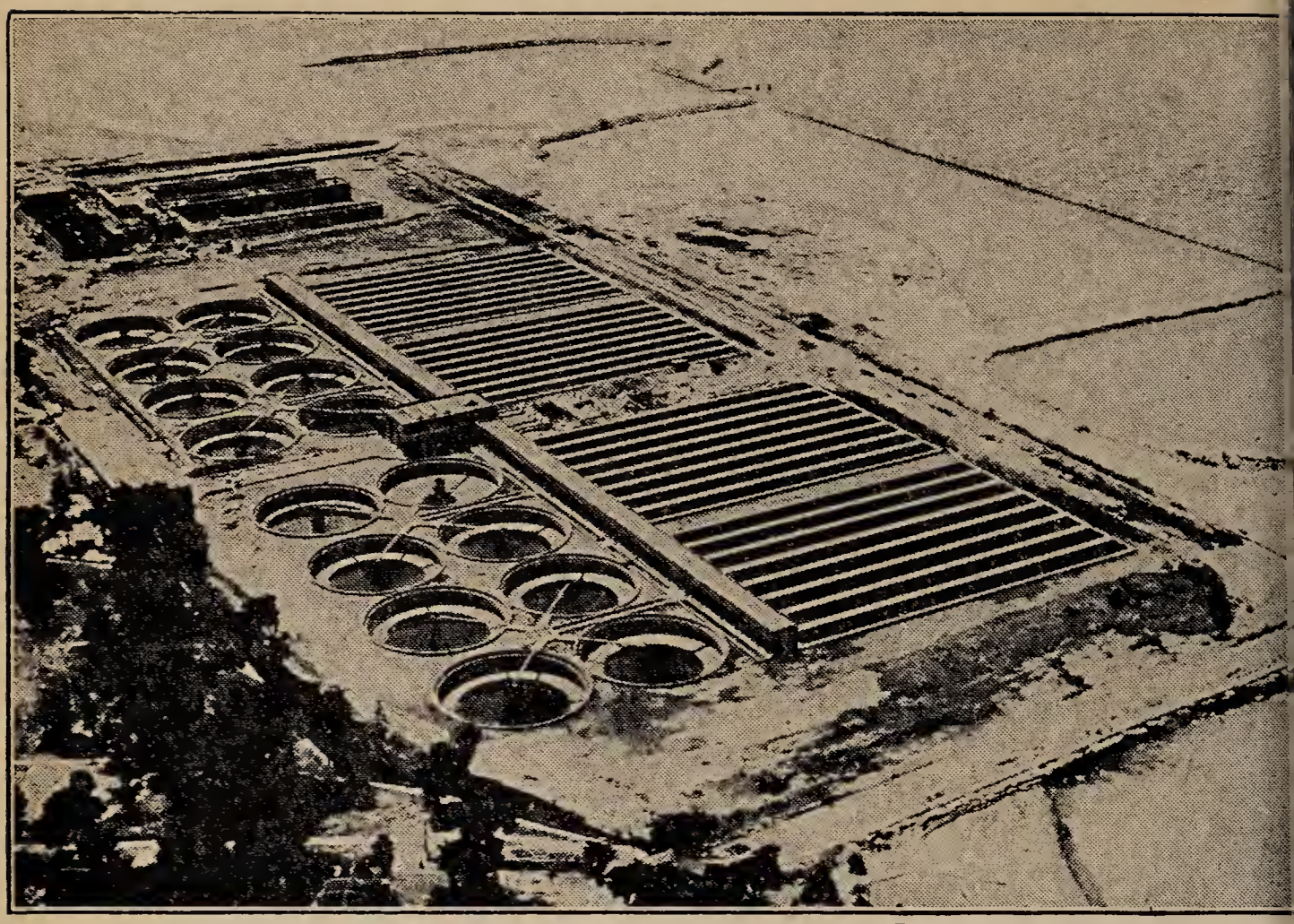
analyzing the water. Drinking water may always be made safe by boiling.

Garbage and Refuse Disposal

The collection and disposal of garbage and refuse is a problem which cities are solving more and more efficiently. Waste may be burned or buried, the garbage fed to pigs, and the refuse used to fill in lowlands. It is important that all waste be disposed of so that there will be as little unpleasant odor as possible and so that there will be no feeding and breeding place for flies and rats. Refuse should never be allowed to clutter back yards, alleys, or vacant lots, and until collected, all garbage should be kept in metal containers with rat-proof and fly-proof lids. In the country and in small towns, and on camping, hiking, and motoring trips, the same methods of garbage and refuse disposal are possible. And the same care about flies and rats should be observed.

Sewage Disposal

Human wastes are among the most dangerous of those which must be disposed of. The germs of disease are most often carried away in the body wastes. Therefore, these wastes must be disposed of where they will not contaminate drinking water or soil where vegetables or fruits are to be grown, especially those that are eaten raw. Body wastes are dangerous on bathing beaches, in oyster and other shellfish beds, or bodies of water from which ice is

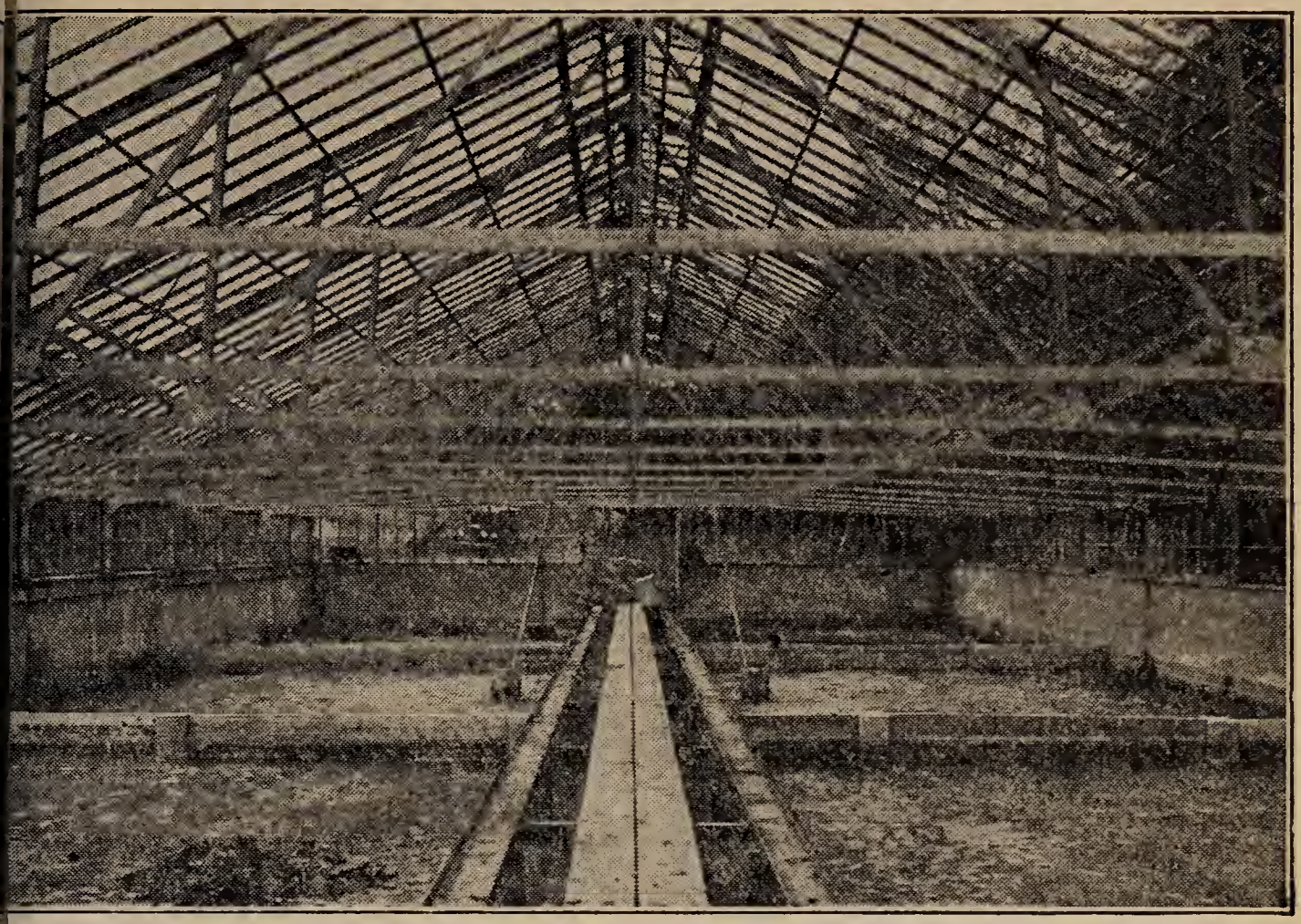


By Ewing Galloway, N. Y

Filter beds in a large sewage plant

cut in winter, and in any place where they can be visited by rats and flies.

Outdoor toilets should be screened, and chlorinated lime or sand used freely in the pit to prevent odors. They should be so located that they cannot possibly drain underground into any well or source of drinking water. Septic tanks and other sanitary types of toilet are being used more and more in rural districts. For more thickly populated communities the sewage from various buildings flows into pipes by which it is carried to a special place of disposal. This place frequently used to be a stream of water or a lake.



By Ewing Galloway, N. Y.

Filter beds of a small city plant

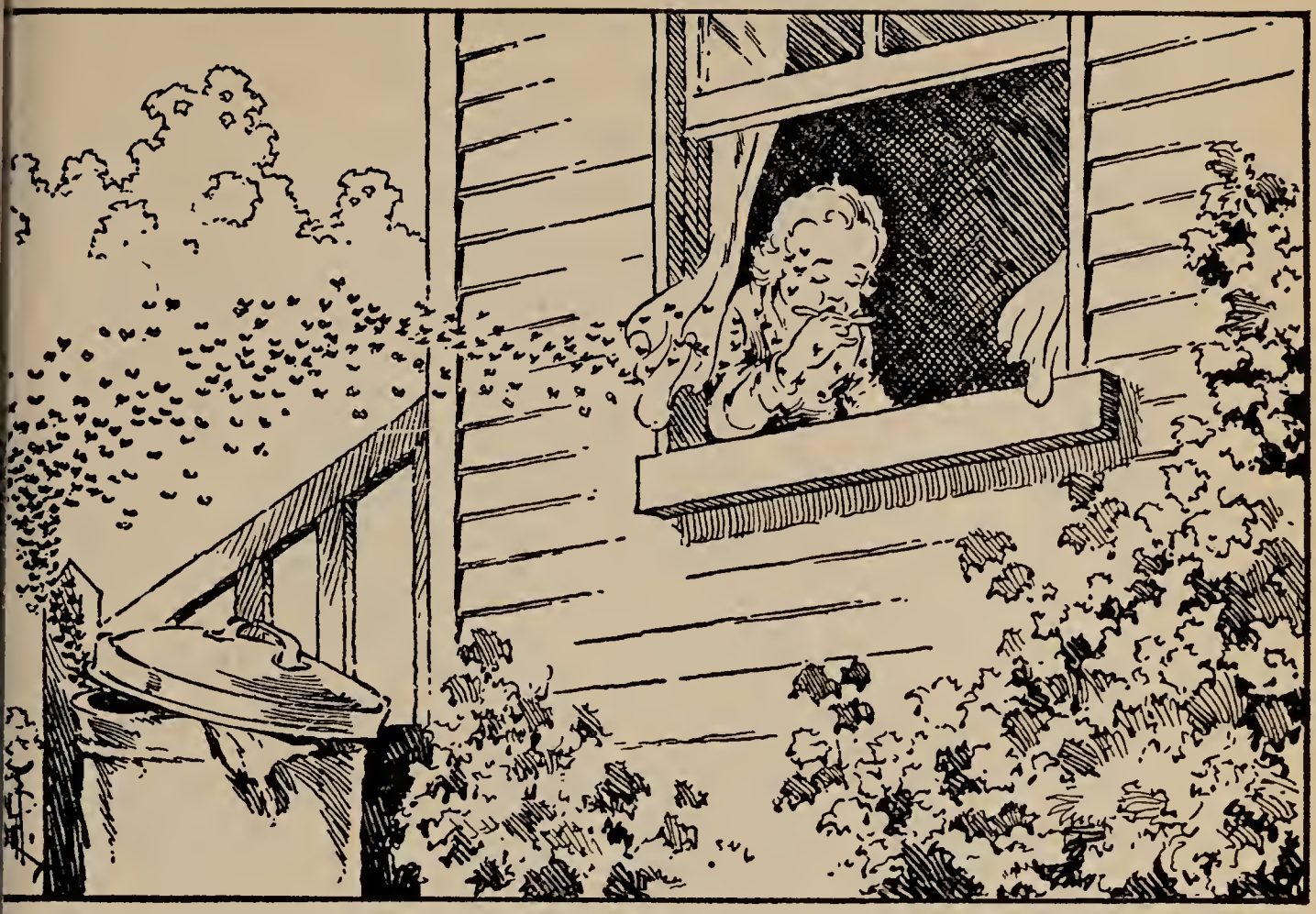
Often untreated sewage was emptied into the same body of water from which drinking water was taken. The city of Chicago used to empty its sewage into Lake Michigan and take its drinking water from the same source. Typhoid became so prevalent that there were sometimes over a thousand deaths a year from typhoid fever. Then the Chicago drainage canal was built to carry sewage away from the lake instead of into it. Drinking water was chlorinated; all milk was pasteurized, and individual cases of typhoid fever and "carriers" were educated and supervised. The result of this was that in 1932 the typhoid death rate in Chicago was only 0.4 per 100,000.

Ashland, Wisconsin, emptied its sewage into, and took its drinking water from Lake Superior. A serious epidemic of typhoid fever in the winter of 1893–4 brought attention to this dangerous practice, and a water-filtering system was installed. Since then Ashland has been free from typhoid.

Sand filters are often used to destroy the dangerous bacteria in sewage. By this method the helpful bacteria which live in sand and gravel are given a chance to destroy the harmful bacteria in sewage. These same bacteria have a chance to act when human wastes are buried. This method of disposal is useful on camping and hiking trips. Diseases such as typhoid fever, cholera, dysentery, and hookworm are wiped out most surely by sanitary measures, including intelligent supervision of food, milk, and water supplies, and proper garbage, refuse, and sewage disposal.

Immunization

Immunization, or treating persons so that they cannot take certain diseases, is used not only in fighting smallpox, diphtheria, and typhoid fever, but it is also used to prevent rabies* and tetanus, or lockjaw. Hydrophobia* is so slow in developing that preventive treatment is given only after a person has been bitten by an animal suffering from that disease. The serum which prevents tetanus is used only after an injury in which dirt might have carried the tetanus bacillus* or its spores* deep into the flesh. It offers another reasonably sure way to fight disease.



There can be no real quarantine with flies at large

This concludes the list of diseases which can most surely be prevented by vaccinations and inoculations, and those which are best wiped out by sanitary measures. There is still a long list of communicable* diseases for which there is no specific preventive serum or vaccine, or for which vaccine have not yet been as highly perfected as they have in cases described, but the followers of Pasteur and Jenner are still at work. It is probable that there will soon be a surer way to prevent whooping cough and scarlet fever than has yet been discovered. In the meantime these diseases must be fought with personal hygiene.

★ Epidemics and Their Prevention

The letter *F* stands for *fingers, flies,* and *food*—the three principal spreaders of disease. We know today that diseases are spread largely by germs and the breakdown of the organs of our bodies. However, our ancestors held demons responsible for disease and the spread of epidemics. They believed these demons, hungry and thin, fought their way from the underworld past the holy ramparts of cities. Then they fed first on infants and later on stronger adults. Not until their hunger was satisfied did they lose their desire for human flesh. Then they went away. While they remained in the body of their victim, they ruled it mercilessly.

Various means were used to cast out the invading enemy. The Indian medicine man tried force so as to make the habitation of the demon unbearable. The diseased people were whipped and weighted down with chains. Others were given ill-smelling and horrid-tasting drugs. More moderate methods also were adopted. To entice the demon out of a person, charms, incantations, and sacrificial roots and herbs were a part of many elaborate ceremonies.

One of the first to teach that disease was due to a disturbance in the body itself was Hippocrates, who lived in the fourth century B. C. He is known as the Father of Medicine.

Although science has done much to prevent or control epidemics, there is no satisfactory explanation as to why they flare up, spread like wildfire, and then suddenly die down. The bubonic plague was

Vaccination plays a big part in reducing disease

one of the worst epidemics of the Dark Ages. The germ was planted in the body of its victims by the bite of a flea after it had fed on an infected rat or some other rodent. The "black death" of the Middle Ages almost wiped out European civilization. According to archaeological* discoveries, infantile paralysis has been known at least since 3700 B. C. Influenza has a record of violent flares on an average of every seventeen years. During the World War it exacted a toll of over 30,000,000 victims in all parts of the world.

Tuberculosis at one time was the cause of more deaths in the United States than any other disease. In 1904 the National Tuberculosis Association was

formed. Because of its health-education campaigns, this disease now is coming under control. Indeed, if the present rate of prevention continues, it is believed tuberculosis will be a rare illness within a few generations.

Smallpox, another of the most terrible plagues, has disappeared from properly vaccinated communities. Typhoid, formerly a great scourge of military and civil authorities, is practically unknown in the army and navy. Few civilian cases are reported in large cities. Antitoxins, properly used, have reduced the death rate for lockjaw and diphtheria almost to zero. We have learned that malaria is conveyed to man through certain varities of mosquitoes. Their breeding places are being destroyed.

Many animals are doing a large share in helping to rid us of destructive insects. Fish destroy hordes of those which threaten our food supply as well as our comfort. Rabbits and guinea pigs may be great pets of boys and girls, but in laboratories they are almost indispensable as experimental animals. Guinea pigs particularly have been of great value in bacteriological laboratories. Most of the new vaccines and antitoxins are first tried on them. Their reaction determines an accurate human dose. Tiny white mice and often white rats also are used in laboratories to determine the seriousness of some diseases and to help decide the proper treatment in others. The use of monkeys in laboratories is increasing. It has been found they are susceptible to many human ailments by which other laboratory animals are not attacked.

Public co-operation can rout disease

In the past the diseases taking the most lives were caused by germs. Today those taking the greatest human toll are the result of a breakdown of the organs. Foremost among these are heart disease and cancer.

Things to Do

1. Make a list of the things you can do to keep physically fit while going to school.

2. Make a list of the various things that people thought caused yellow fever.

3. Make a list of things your community does that make the place in which you live more sanitary.

4. Suggest ways in which improvements in sanitation might be made in your community.

5. How have your parents safeguarded you against communicable diseases?

6. What can you do to help yourself and others in guarding against communicable diseases?

7. Do you have many flies around your home? If you do, find the places where these flies are breeding. Write a list of things you can do to stop the breeding of flies.

8. Make a list of diseases that can be prevented by immunization.

9. Visit a modern dairy and tell your class the things this dairy does to safeguard your milk supply.

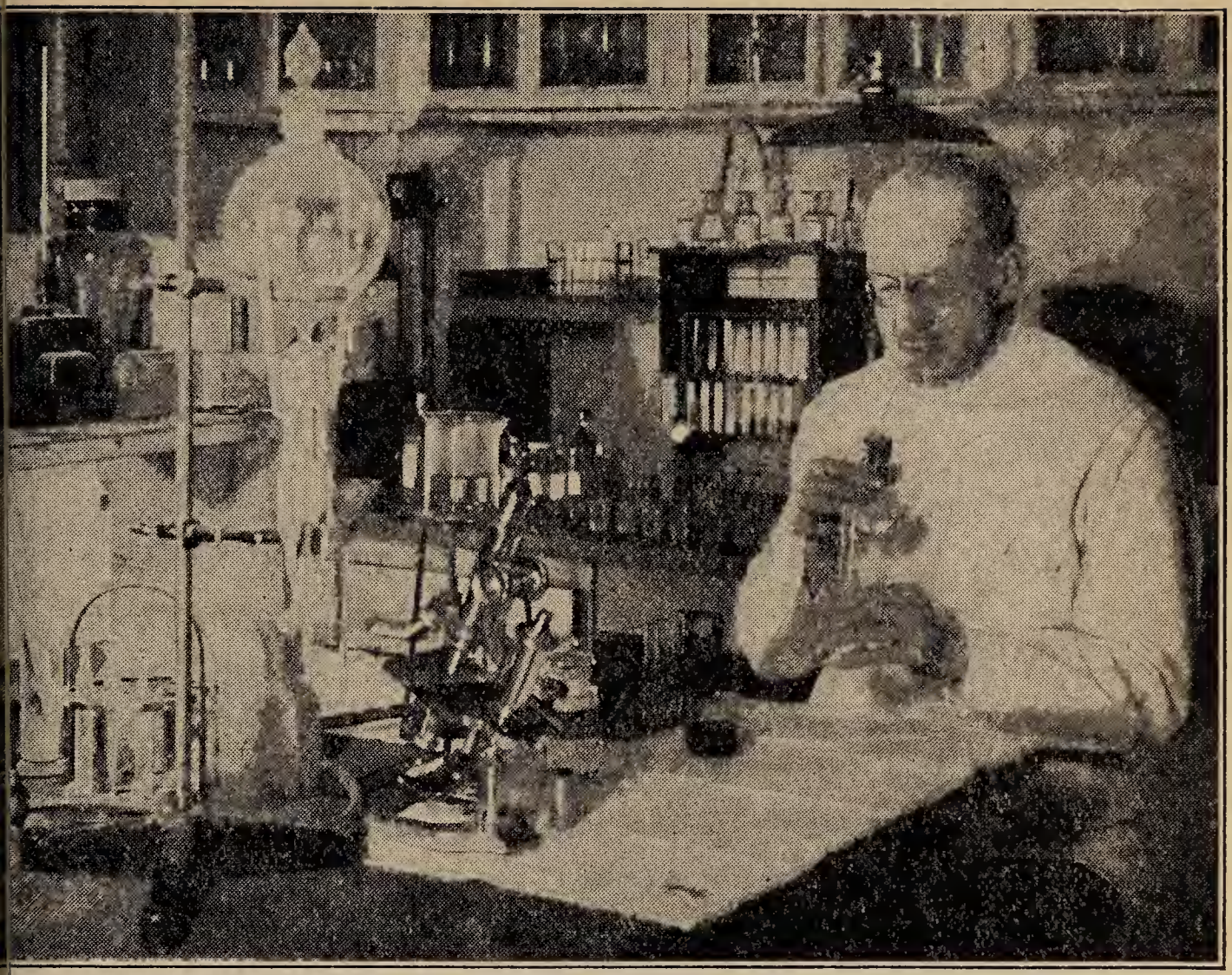
10. How is garbage removal carried on in your community?

11. Find out what kind of garbage container you have at your home. Discuss with your parents whether it is sanitary.

★ 12. Find out what your community does to safeguard the milk that you drink.

★ 13. Find out what kind of sewage disposal system you have in your community.

★ 14. Find out what method of sewage disposal is the best one for the community in which you live.



By Keystone View Co., N. Y.

CHAPTER X

How You Can Prevent Disease

Where Do Hair Snakes Come from?

"Oh, here is a horsehair," said John. He stooped over to pick up a long black hair which was lying in the road.

"If you put it in water and leave it there for a long time," said Bill, "it will turn into a hair snake."

"Honest?" said John, "I found a hair snake once."

"So did I," answered Bill, "and the fellow who was with me said that it came from a horsehair that had fallen into the water."

John took the horsehair home and put it in a glass jar with some water.

"It almost looks like a snake already," said John to himself. He put the jar under his bed, and every night before he went to sleep he took it out and examined it. Every morning before he got up he examined it. Nothing happened.

Weeks passed and months passed and still nothing happened to the horsehair. When John's mother cleaned the house, she made him take the jar outdoors. John carried the jar out and hid it in some bushes in the yard and forgot all about it. The next fall he discovered it accidentally. The jar still had some dirty water in it and the horsehair was still there, but there was no hair snake.

John was disgusted with himself for believing such a silly story, but he need not have been. In fact he might have been very proud, for he had found out for himself that the saying about horsehairs turning into hair snakes was false.

Where Do Maggots Come from?

Three hundred years ago people usually believed what they heard. They seldom made tests or experiments for themselves. For example, when certain people said that maggots grew from decaying matter, most people believed them. Apparently it was not until 1671, fifty years after the Pilgrims

landed in this country, that anybody tried to find out the real facts about maggots.

In that year an Italian naturalist took several jars. He put meat in each jar. Over some of these jars he put wire gauze or parchment and fastened it down tightly so that no flies or insects could get to the meat. The other jars he left open. He watched carefully for maggots to grow in the meat. After awhile he began to see them. But they developed only in the jars that had been left open to flies and insects. There were no maggots in the covered jars.

By this simple experiment the Italian naturalist proved that maggots do not grow "by themselves." Flies and insects lay eggs in meat and decaying matter and maggots develop from these eggs. Maggots are one stage in the development of flies just as caterpillars are one stage in the development of butterflies. The Italian naturalist by his experiments established a great truth: no visible living thing develops by itself. It must be produced by some other living thing like itself.

Invisible Living Things

After that, people were quite willing to believe that visible living things cannot grow "by themselves." But what about the strange living things which Leeuwenhoeck, in Holland, found when he looked through the fine lenses of his microscopes? They were alive. There was no doubt about that. Where did they come from? It took almost two hundred years to find the answer to that question.

These strange little living things are called *microorganisms*. Anything that has life in itself is an organism. Because these organisms can be seen only through a microscope, they are microorganisms. For years it was believed that spoiled and decaying matter changed into microorganisms. No one believed that microorganisms caused decay. It was hard to find out the truth because microorganisms were so small and so difficult to handle. They were not easily seen like flies and maggots.

Many people tried to answer the question, where do microorganisms come from? One scientist put boiled meat juices in bottles and sealed the bottles carefully. He then examined the juices after a time and found microorganisms in them. This led him to think that the organisms had been produced by a force within the meat juice. "For," he reasoned, "how could anything have entered? The bottles were sealed."

Another scientist, Spallanzani, was more careful. He boiled glass flasks and then filled them with boiled meat juice. The flasks had slender necks which he held in a flame until the glass melted and sealed the openings. He then watched these flasks for many weeks. There was no spoiling and no decay, and there were no microorganisms.

"By heat you destroy the forces which cause microorganisms to grow," argued some people.

"No," answered Spallanzani, "what I did was to kill all microorganisms with heat so that they could not produce more organisms like themselves."

Then he opened his flasks. Soon the meat juice was filled with microorganisms and it began to spoil.

"It is microorganisms which produce decay, not decay which produces microorganisms," said Spallanzani, but he could not convince many people that this was true.

Where Microorganisms Come from

It was Pasteur, who lived less than one hundred years ago, who finally proved beyond a doubt that invisible living things, like visible living things, must be produced by other living things like themselves. When he heated flasks of meat juice, and sealed them as Spallanzani had done, no microorganisms grew in his flasks. When he broke the necks of his flasks the air rushed in carrying invisible living things which soon caused the meat juice to spoil. He carried more flasks high on mountains and showed that the higher he went the fewer microorganisms there were in the air which entered his flasks when the necks were broken. If microorganisms had been produced by a force within the meat juice they would have grown as abundantly on the mountain top as anywhere else. In this way, Pasteur established another great truth; invisible, as well as visible organisms, can be produced only by other organisms like themselves.

Pasteur had a simple, clear way of explaining his experiments. Most people believed him when he showed them how microorganisms could develop only from other microorganisms. Only a few people were hard to convince.

How Microorganisms Develop

Germ is another word for microorganism. Germs are very mysterious. They do not lay eggs or produce seeds. How, then, do they produce more germs? Each germ is made up of a single cell. Like all cells, germs form more germs by dividing, that is, one cell becomes two and each of those becomes two more and so on. If conditions such as food, heat, and moisture are just right, one germ can become two in about fifteen minutes. Then each of these becomes two more, making four. Each of them divides into two more, making eight. In the course of several hours there will be thousands of germs.

A germ cell, like any other living cell, takes in nourishment and gives off waste. Some germs give off wastes that are poisonous to the human body. These poisons are called *toxins*. Substances manufactured by the body to destroy toxins are called *antitoxins*.

Germs are divided into two classes, bacteria and protozoa. There are hundreds of different kinds of bacteria. Only a small number of bacteria cause disease. Many are helpful to mankind. Pasteur worked with both helpful and harmful bacteria.

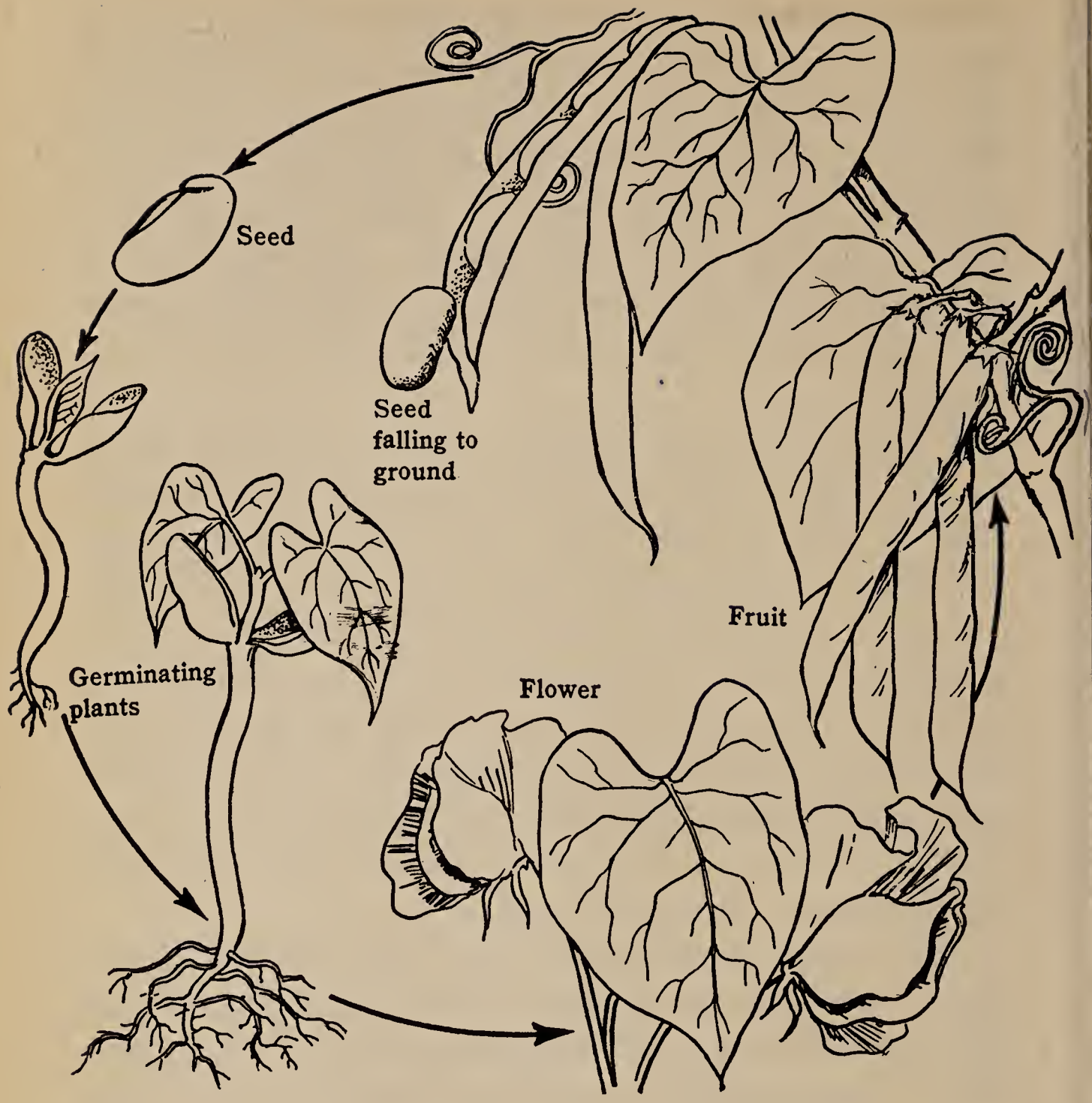
How Bacteria Help

Pasteur first discovered the lactic-acid bacteria which cause milk to sour. Lactic-acid bacteria feed upon the sugar that is in milk. They give off an acid which is not poisonous to people, but it prevents

disease bacteria from growing. When enough acid is formed in the milk, all the disease-producing bacteria die. Before the days of refrigerators, very sour milk was often safer to drink than sweet milk. That is probably why people used so much sour milk, or *curds and whey*, as it was called. Bacteria help to turn milk into cheese, cabbage into sauerkraut, apple juice into hard cider, and various fruit juices into vinegar.

Probably the most helpful of all bacteria are those which destroy dead and decaying matter. It is no wonder that people used to think that bacteria developed from spoiled food and other putrefying matter. Whenever anyone looked at a bit of such material through a microscope, it was swarming with bacteria. The decaying matter was not turning into bacteria in the way people supposed. The bacteria were acting upon the dead organisms and destroying them. Bacteria turn dead matter into elements which plants can use for food.

The process is somewhat like this: Plants grow, that is, they take nourishment and moisture from the soil and with the help of sunshine turn it into plant cells. Some plants or parts of plants are used for food by animals, insects, fish, birds, and people. Plants live for a time and then die. Before the entire plant dies, the leaves or the fruit or the branches may die and fall to the ground. In the soil are countless thousands of bacteria which feed upon the dead plants or parts of plants, and turn them back into nourishment for other plants to use. That



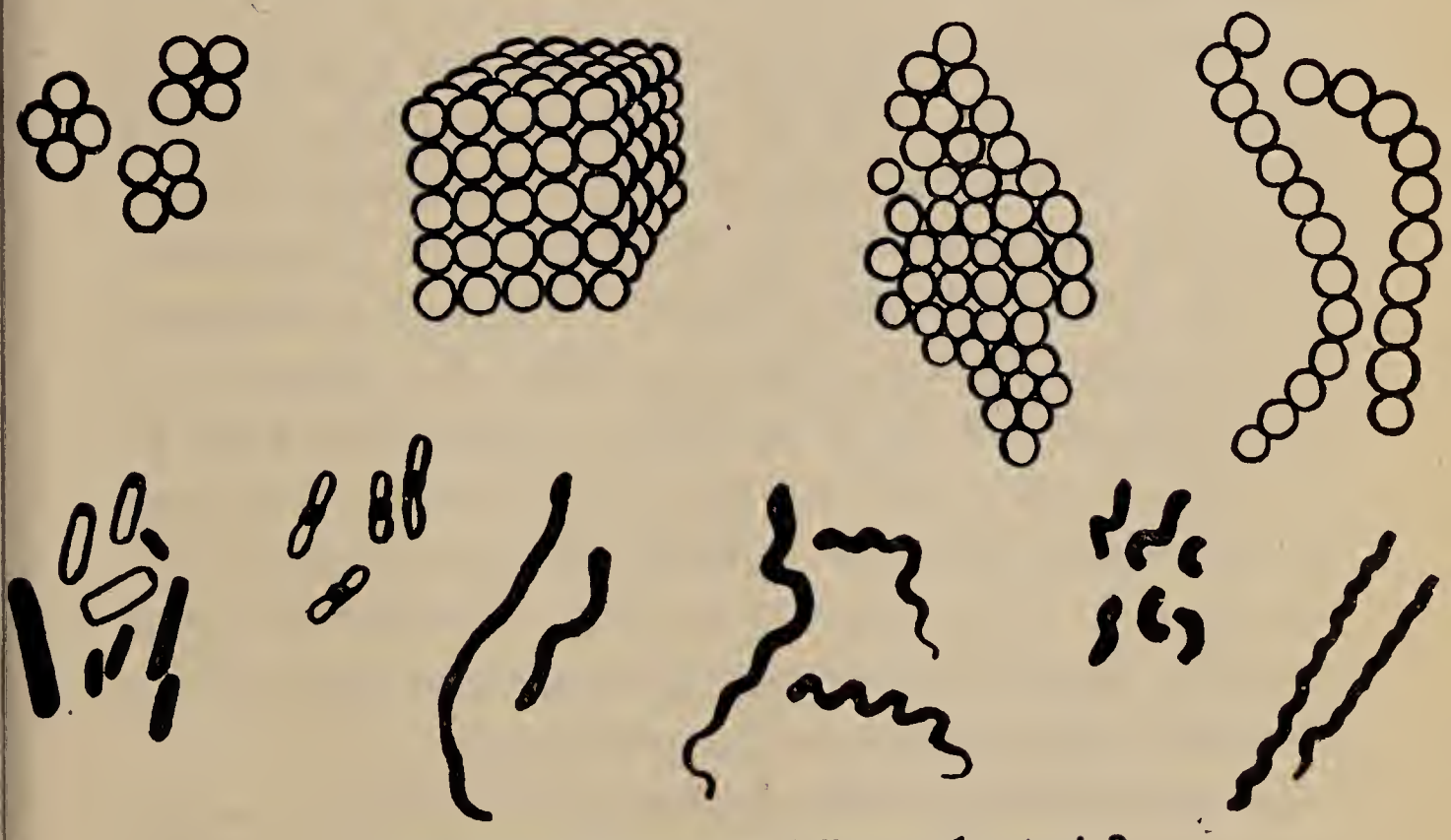
The life cycle of a plant

is why the soil in a woods is so black and rich. For years bacteria have been acting upon dead leaves and branches of trees and small plants and turning them back into elements upon which other plants can feed.

When people, insects, birds, fish, and animals die, bacteria destroy the dead bodies and turn them into elements from which more plants can grow. Bacteria destroy dead organisms, while plants build up living organisms. Many kinds of bacteria take part in this tearing down process. They are constantly at work in ponds and streams as well as in sand and soil, turning useless and harmful matter into useful materials.

Harmful Bacteria

The harmful bacteria are those which cause disease. They vary in size and shape and they usually have a name which indicates this shape. Those that are round like balls are called *cocci*. Those that are shaped like little rods are called *bacilli*. Those that are curved like corkscrews are called *spirilla*.



Can you pick out the different bacteria?

The size of bacteria is hard to imagine. No single bacterium can be seen without the aid of a powerful microscope; 10,000 of the bacteria which cause tuberculosis laid end to end would measure about an inch. There are probably bacteria so small that they cannot be seen through the most powerful microscopes. The germs which cause smallpox and hydrophobia may be that small. These two contagious diseases can always be prevented by the right treatment, and yet the germs which cause these diseases have never been seen under the microscope. No one knows just what they are or what they look like. The bacteria which produce diphtheria, typhoid fever, tuberculosis, cholera, tetanus, pneumonia, and meningitis* have all been seen and named. But the germs of some of the commonest diseases have not yet been seen.

Most disease-producing bacteria are much more easily destroyed than the helpful bacteria. Lack of food, lack of moisture, bright sunshine, boiling temperature (100° C., or 212° F.) will cause them to die in a very short time. Pasteur discovered that certain bacteria can be killed if heated to a temperature of 130° F. to 160° F., preferably 140° F. to 145° F., and left at that temperature for from ten to thirty minutes. This process is called *pasteurization.* It is applied to milk, to the milk used to make butter and cheese, and to some other foods to make them free from disease germs.

Some bacteria produce spores, that is, they produce reproduction cells with a tough, protective coat which

can withstand heat and other forces which would kill the germ in its ordinary state. These spores, or "sleeping" bacteria, can live for a long time, but they cannot develop into active bacteria until conditions again become favorable. The bacteria which cause anthrax* and tetanus (lockjaw) form spores. Most other harmful disease-producing bacteria do not form spores.

Preventing the Spread of Germs

Florence Nightingale helped to prevent the spread of disease by cleaning up the surroundings, or environment in which people lived. Gorgas cleaned up Habana and Panama City and made them the most healthful cities in the world. Jane Addams secured better garbage collection, better street cleaning, and better living conditions in order to reduce the amount of sickness among her neighbors. Health officers everywhere are working for safer water, food, and milk supplies. These are all community health projects. They are very necessary, but community co-operation does not strike at the most important of all sources of communicable disease. Most communicable diseases pass directly from person to person.

"Man is man's greatest foe in this regard," says Milton Rosenau.

Boys and girls must be taught how to keep their diseases to themselves. They must also be taught how to protect themselves from the communicable disease which others have.

By Keystone View Co., N. Y.

Everything baby touches must be clean. Why?

How can nurses and doctors go in and out of contagious hospitals and tuberculosis sanitariums and not catch diseases or carry them to others? It is because they have been taught how to protect themselves from communicable diseases, and they *practice what they have been taught.*

There are no secret methods which these doctors and nurses use. Their methods are free to anyone who wishes to use them.

How Are Diseases Carried?

Air is a poor carrier of disease germs. Most communicable diseases are transferred from one person to another more or less directly. This is known as "contact infection." In some instances, germs are carried in discharges from the nose and mouth or from open sores on the body. In other diseases they are present in the urine and intestinal discharges. From these places they get on the sick person's hands or objects soiled with bodily discharges and intestinal discharges. Germs may be transferred from one person to another by kissing or shaking hands, or may be carried on droplets when one person coughs or sneezes in another's face.

Germs are left on the handkerchiefs, towels, washcloths, cups, spoons, dishes, and other utensils which are used by people with communicable diseases. They may be left on toys, food, or anything that has been touched by the sick person. The germs of some diseases are sensitive and die quickly unless they have food, warmth, and moisture. The germs of other diseases are not easily killed. The germs of malaria, sleeping sickness, and other diseases are transferred by insects. Fleas, lice, bedbugs, ticks, mosquitoes, and flies may all be carriers of disease.

Destroying Disease Germs

A person cannot possibly get a communicable disease unless the living germs of that disease get inside his body. There are, then, two ways by which

communicable diseases may be kept from spreading. The first is to destroy germs as soon as possible after they leave the body of a sick person. A sick person should always cough, sneeze, and spit into cloths or papers. These should be immediately dropped into paper bags and burned as soon as possible. He should keep his hands away from his mouth and nose and wash them often with soap and very hot water. Bandages soiled with pus from bodily sores should be placed in paper bags or wrapped in many thicknesses of newspaper and burned as soon as possible.

An object which has disease germs on it or in it is said to be *infected*. The process of destroying these microorganisms which cause disease is called *disinfection*. All objects soiled by the discharges of a person with a contagious disease should be disinfected.

Sheets, pillow cases, clothes, towels, wash cloths, dishes, and many infected articles may be disinfected by using hot water and soap. In general an article washed thoroughly in soap and very hot water and dried thoroughly is free from germs. Exposure to sun and wind also helps to destroy harmful bacteria.

So far as we know, the germs of the common cold can be destroyed easily. The germs of tuberculosis, scarlet fever, and some other contagious diseases are harder to destroy. Directions for disinfecting in these cases should be obtained from a physician or health officer.

In typhoid fever, cholera, dysentery, and other intestinal infections the germs are present in the urine and intestinal discharges. These should, then, be

Wait! Use a handkerchief

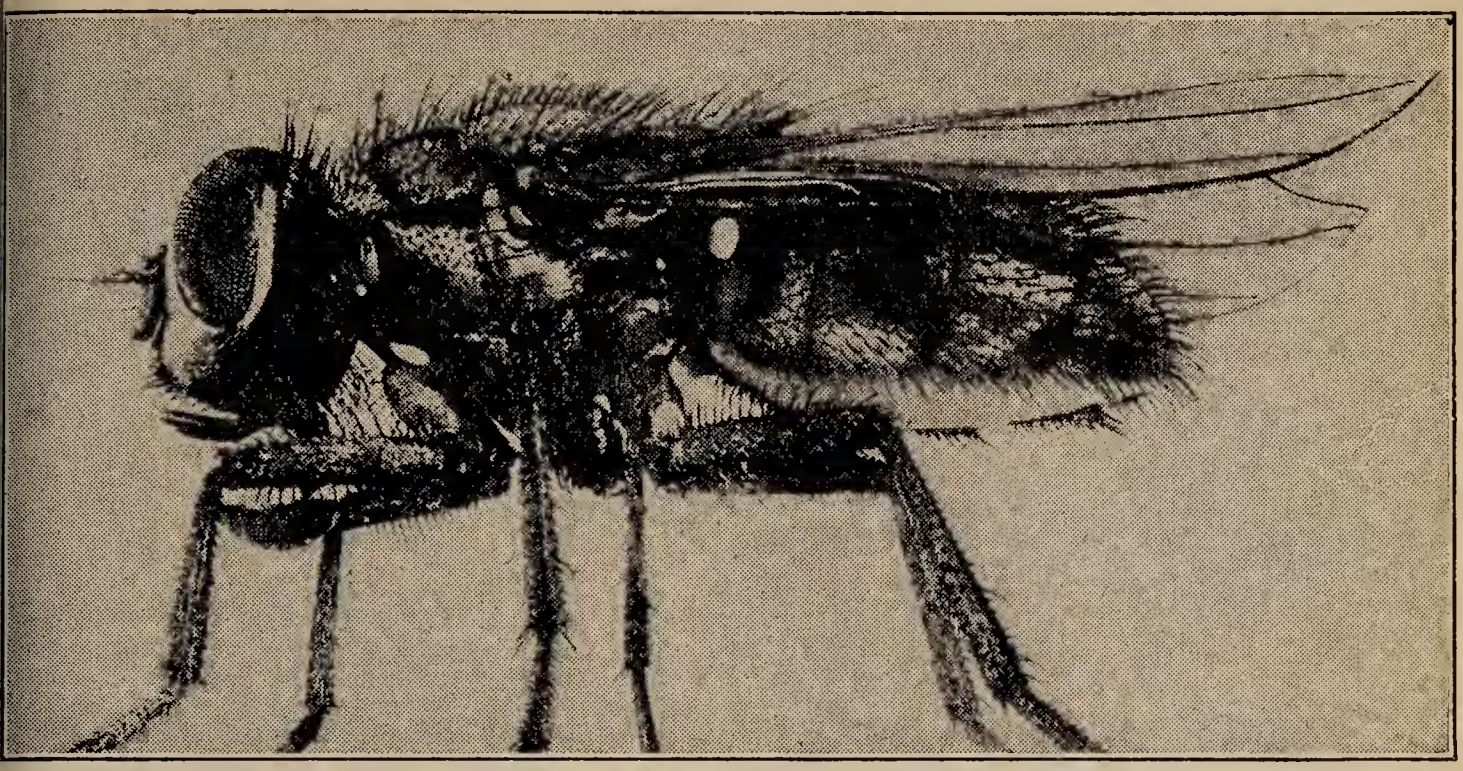
mixed with a disinfectant, covered to keep out flies and allowed to stand for two hours before being disposed of. Lime or chlorinated lime are cheap and valuable disinfectants. They lose their power when exposed to air, so they should be obtained fresh and kept tightly covered until used. Physicians and health officers can recommend other disinfectants.

The hands of anyone coming in contact with a person having a contagious disease should be disinfected. If clothing has become contaminated it should be changed. Insects, especially blood-sucking insects like mosquitoes, should be kept away from sick people.

Usually by the time a person recovers from a communicable disease his body is free from the germs which caused the disease. After that he cannot infect anyone else. In a few cases, the germs of a disease may stay in a person's body after he is well. A person may retain diphtheria bacilli or other disease germs in his throat. He may have typhoid bacilli, hookworms, or the germs of cholera in his intestines. He may have the germs of malaria in his blood. These people may go on spreading the disease although they are entirely well themselves. They form a difficult problem for public health officers. Even these people would not be likely to spread disease if they exercised absolute personal hygiene by keeping themselves scrupulously clean, washing hands thoroughly after going to the toilet and before handling food, keeping their hands and other objects away from the mouth and nose, and protecting others from any discharges from their mouths or noses. Anyone's bodily discharges may contain dangerous germs. Every person, whether sick or well, should be sure to dispose of all bodily discharges so that he cannot infect anyone else.

Protecting Well Persons

There are several ways in which people may be protected from sickness. In the first place, the body protects itself. Not all ways in which communicable diseases are spread are understood. It seems to be true that germs outside the body do no harm. It is those that get inside the body that cause trouble.



By Keystone View Co., N. Y.

The hairy legs of the fly carry many germs

Germs may enter the body through the mouth, nose, or eyes, but there are natural barriers in all these places. Tears try to wash away germs and they are slightly germicidal in their action. The saliva and the secretions of the stomach of a healthy person can destroy many harmful bacteria. The hairs in the nose and the hairlike cells which line the breathing structures catch germs and sweep them out of the body. The normal healthy mucous* membranes which line the digestive tract and the respiratory tract help to guard against germs.

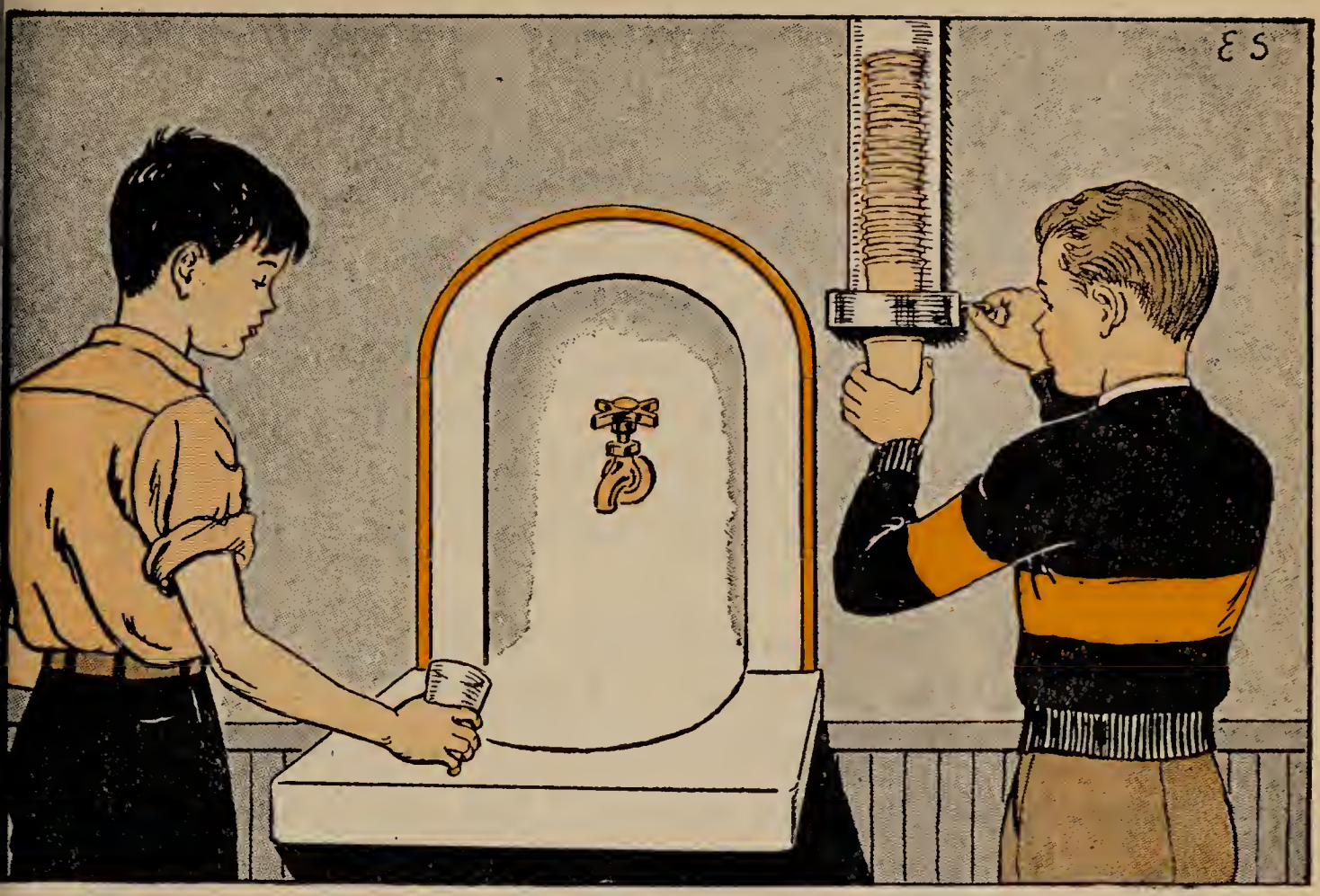
A normal healthy skin is practically germproof. It is said to possess disinfecting properties. Experiments seem to prove that bacteria will die if placed on clean skin. They will live for some time if placed on dirty skin. If there is a cut, scratch, or any kind of opening in the skin, germs can easily get inside the

body. That is why all places where the skin is broken should be washed carefully with soap and clean hot water, disinfected, and covered with a sterile cloth until they are healed. Remember that a scratch need not be deep enough to bleed to be dangerous. Germs may enter the body wherever the outer skin is scraped off.

Besides the outer protections which the body has there are certain substances within the blood and other body fluids which help the body to resist infection. The power which the body possesses to resist infection is called *immunity*. One attack of typhoid fever, smallpox, scarlet fever, measles, yellow fever, typhus fever, or mumps usually makes a person immune for the rest of his life. This is not always true.

Under certain conditions an entire community acquires an immunity to a certain disease. In Cuba the natives had an immunity to yellow fever, but the Americans coming into the island had no such immunity. Persons who have been vaccinated for smallpox have an immunity to that disease.

To help protect themselves from sickness, boys and girls should never visit friends who have communicable diseases. They should not even play with a brother or sister who has a cold or any other communicable disease. They should not touch toys, food, dishes, bedding or clothing, or anything that is contaminated with disease germs. They should stay away from crowds in times of epidemics. They should have their own towels, wash cloths, drinking cups, and toothbrushes. They should always use



Use a clean cup at a public fountain

drinking fountains and toilets in a sanitary way. They should bathe often, wash hands and faces often, and keep fingers and other objects away from mouth, nose, and eyes.

Squeezing Pimples

Blackheads are black dirt which has accumulated in the pores of the skin. Careful cleansing of the skin every night, usually with soap and hot water, will prevent the formation of blackheads. The dirt in blackheads is likely to contain harmful bacteria. If a blackhead is squeezed, these bacteria are often pressed farther into the skin. There they may find

conditions of warmth, food, and moisture which cause them to grow and develop into a serious infection.

Pimples are slight infections of the skin. They are often brought on by squeezing blackheads. A pimple should never be squeezed. People have been known to die from infection which started by squeezing a pimple. The germs that are in the pimple are pressed into the tissues under the flesh. There they multiply and are finally carried by the blood to the brain, causing death. The best treatment for a pimple is to let it alone!

A boil is a serious infection of the skin. A boil should never be neglected. Applications of very hot water should be applied to a boil as soon as it appears. These should be kept up until the boil comes to a head, that is until a little light pus appears just under the surface of the skin. Only a physician should be allowed to open a boil. No one else has training or materials necessary to remove the infected material from the boil without spreading the infection to other parts of the body. Proper food, bathing, rest, and exercise will help the body to resist such skin infections as boils and pimples.

★ The Microscope and Its Use

Have you ever used a microscope? It is a wonderful instrument. Through its tiny lens-capped end, a new, strange world will be revealed to you. The tiniest organisms will be magnified many times. Not much stretch of the imagination will be required to make a mouldy crust of bread seem like a dense

African jungle, or the insects in stagnant water look like prehistoric animals seen in museums.

It is hard to realize what the condition of mankind would be today without the use of the microscope in so far as scientific studies are concerned. There would be no knowledge of cell structure of animals or plants. Nothing would be known about fermentation, infectious diseases, fertilization, and many other scientific developments which have contributed so much to make this a better world in which to live. What you see, what you eat—everything is a possible specimen which may open up new fields to serve as aids to your health and well being.

In the classic literature of the ancients the use of lenses or mirrors is mentioned. Nero, the Roman emperor who, it is said, amused himself reciting verses while Rome burned, was shortsighted. It is said he looked through a concave* emerald to watch the combating gladiators. In olden days burning-glasses, made of glass balls filled with water, were used by physicians to cauterize the flesh of patients.

The list of microscopic inventions and discoveries is a long one. The modern instrument, with its many refinements, is a far cry from the very simple outfits of Galileo and Leewenhoek, two of the foremost names in early microscopic history. Galileo was one of the first scientific astronomers. He invented, or re-invented, a compound microscope before 1620. This was not surpassed until 1673, when Anton van Leewenhoek, a versatile, industrious little shopkeeper, born at Delft, Holland, made his

microscope. The lenses were mounted between two plates of thin metal with tiny apertures through which the objects were seen. He polished his own lenses and made all the mechanical parts of his instruments. He was the first microscopist to give a description of bacteria. His was the first accurate description of the red blood corpuscles. Among his many physiological studies were investigations of the structure of the teeth and the crystalline lens of the eye.

Two other outstanding names among many who contributed much to the mechanical construction of the microscope were the German professor, Hertel, and the French optician, Charles Louis Chevalier. Later in Europe the microscope reached its highest perfection with Zeiss, Abbe, and Schott. In the United States, Spencer and Bausch and Lomb were the pioneers in the manufacturing field.

Louis Pasteur, founder of the science of bacteriology, was the first chemist to use the microscope as an aid in his work. Of course, you know that people drink pasteurized milk every day. One of the results of Pasteur's studies was to stop the fermentation in milk, by the process known as *pasteurization*. This has been the means of saving the lives of a countless number of children.

Pasteur's success with the microscope doubtless inspired Sir Joseph Lister to use the instrument in his study of organisms that might enter wounds. In this way antiseptics were introduced into surgery. Later Robert Koch, then an obscure German physician, did much research in the field of bacteriology

with the aid of the microscope. Doctor Koch is especially famous for his discovery of the specific germ which causes tuberculosis.

The work of Pasteur, Lister, and Koch marked the beginning of the new era in medical history. With the help of the microscope germs were exposed, and the veil of mystery was drawn from one disease after another.

In 1870 there were only 50 microscopes in the United States, in 1930 about 50,000 were in use. Because of scientific activities since then, the number has considerably increased each year. The microscope not only has been the means of enlarging the boundaries of sciences but it has been a great force in helping man to master diseases which have afflicted the human race since the beginning of time.

Things to Do

1. What are some things that many people still believe in that have been proved to be based only on superstition and hearsay?

2. In what ways can you help to keep your home, neighborhood, and community from offering opportunity for the reproduction of flies and maggots?

3. Ask your teacher to get a microscope and then have your teacher show you slides of microorganisms. Expose some meat juices to the air for a few hours or take a sample of some stagnant water. Put a little of this on a glass slide under a microscope. This will enable you to see some of the tiny germs and observe the different stages of their reproduction.

4. Make a list of as many communicable diseases as you can find. Prepare a table that tells the germ causing such disease, how the disease is communicated (how it spreads), means by which it is combated, and the things you can do that will help you prevent yourself from ever having it.

5. Write a list of things you do that will prevent you from having any communicable disease. What can you do that you have not been doing to make yourself less likely ever to come into "contact" with harmful germs?

6. Make a list of some good general rules to follow if your community should ever have an epidemic.

★ 7. Go to your school or community library and get a book that will tell the story of Louis Pasteur. Ask your teacher if you can give a report or write a paper on some aspect of this great scientist's life.

★ 8. Get a set of the regulations of the State, county, or city health board which controls public health where you live and be ready to tell your class about their rules and regulations.

By Acme Newspictures, Inc., N. Y.

CHAPTER XI

The White Plague

Mr. Beebe Studies the Sea

On Nonsuch Island off the coast of Bermuda there is a group of small buildings which used to be the isolation* hospital for yellow-fever patients. Now that dreaded yellow fever has been wiped out on the island of Bermuda, these buildings have been taken over by William Beebe. He has turned them into a land laboratory for studying fish, snails, eels, and other forms of marine life he hauls up in nets from the ocean around Bermuda. "The hundreds of nets I have drawn through the depths of the sea," said

By Wide World, N. Y.

Mr. Beebe in his helmet

Mr. Beebe, "have yielded a harvest which has served only to increase my desire actually to descend into this no-man's-zone."

The Bathysphere

Fish have a special way of breathing. As water passes through their gills, the oxygen which the water contains is removed and used in keeping the fish alive. Man cannot breathe under water. His breathing apparatus is able to separate oxygen from air but not from water, and if he is without air for more than a few minutes he will die. In order to provide himself with air while he walked around on the bottom of the ocean Mr. Beebe invented a kind of metal helmet which fits over the head and tightly against the shoulders. In front of the face there is glass which enables the wearer to see where he is going. Through the rubber hose at the top of the helmet air is pumped into the helmet. Wearing this, Mr. Beebe can lower himself from a boat and walk around on the bottom of the ocean. He can stay down as long as someone above pumps air into this helmet and as long as he does not get cold.

When he is in water sixty feet deep he can feel the increased pressure of water against his body. It becomes almost painful in his head and eardrums. He knows that if the pressure should become greater he would become unconscious and might even die, so he keeps away from water more than sixty feet deep.

William Beebe's great desire to see what exists far down in the ocean inspired him to make, with the help of a friend, a steel sphere. It is large enough to hold two people, and is so made that it can be lowered from the deck of a boat a quarter of a mile into the ocean. He calls it a *bathysphere.* The bathysphere is so strongly made and carefully bolted shut that even the great pressure of deep ocean water cannot force itself through. Tanks provide oxygen to keep people alive while they are shut in the sphere.

Under the Water

"At eleven hundred feet," wrote Beebe of one of his trips in the bathysphere, "I surveyed our sphere carefully—the door was dry as a bone, the oxygen tanks were working well and by occasional use of our palm-leaf fans, the air was kept sweet. The walls of the bathysphere were dripping with moisture, probably sweat from the heat of our bodies condensing on the cold steel." At another place he mentions the temperature in the sphere as being 72° F. And, most interesting of all, are Mr. Beebe's words describing his sensations at the end of his

first trip into the depths of the ocean in the bathysphere.

"About an hour after we started we were on deck again," he wrote, "waiting for the tedious and deafening pounding and unscrewing of the many giant nuts which held us safely in. As the center bolt came loose we could hear the hissing escape of the compressed air which we were breathing. Yet we felt no ill effects and no sense of oppression.

"At last the huge door was swung off and the sunlight poured in. I started to uncoil in order to climb out and suddenly realized how completely the body can be subordinated* to mental interest and emotion. I was almost paralyzed from the waist down, with legs and feet sound asleep, and I found my cushion reposing in the chemical rack overhead.

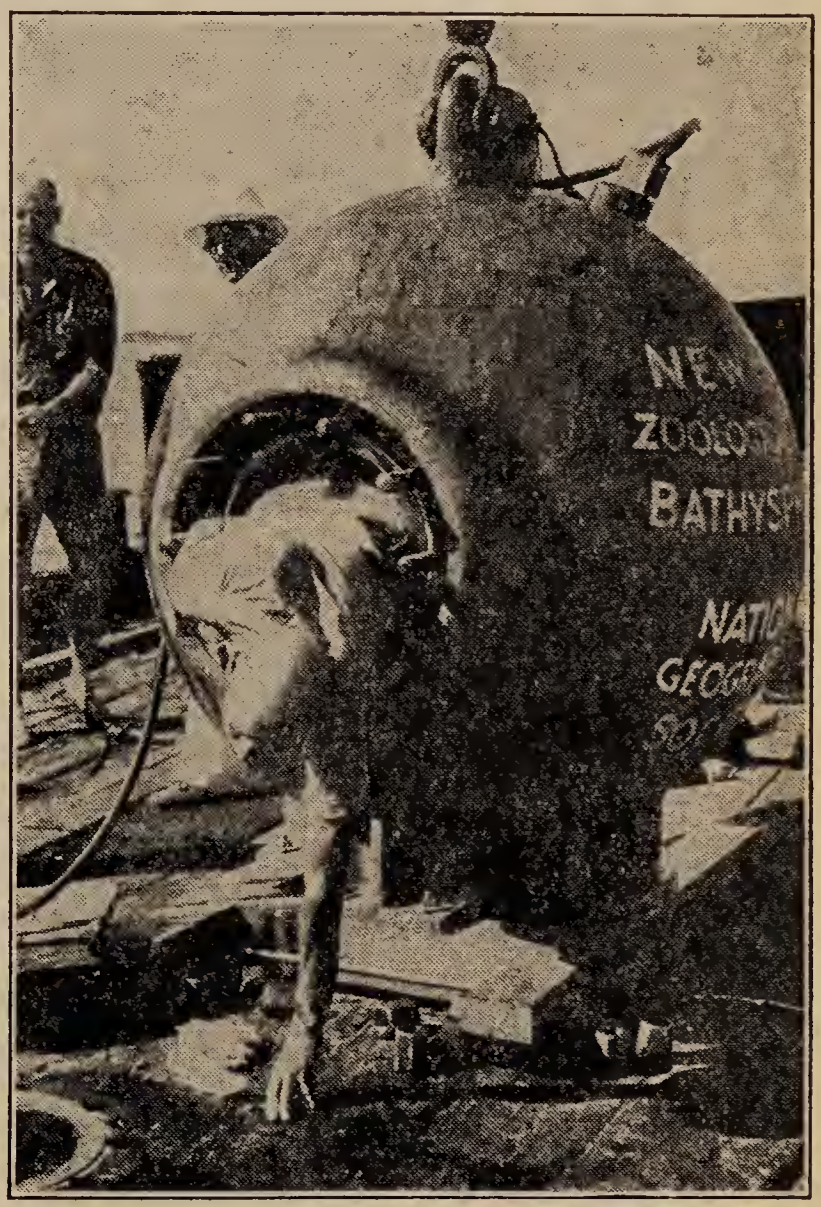
"At the beginning of the descent we had mislaid a monkey wrench and I now discovered that I had been sitting on it. So deeply was it tattooed into my person that the marks were distinct quite four days later. I found the sunshine more yellow than I have ever thought it, but nothing so wonderful as the blue of the ocean's depths."

Oxygen and Breathing

Oxygen is necessary for life. Yet how little a person is conscious of the complicated structures of the body by means of which oxygen is removed from the air he breathes and taken into the blood. "As simple as breathing" is a common expression, and normal healthy breathing, or respiration, requires no

special effort and goes on when a person is asleep as well as when he is awake. But although years have been spent in studying the lungs, scientists are still unable to explain the exact way in which oxygen gets from the air in the lungs to the red corpuscles of the blood, and carbon dioxide* gets from the blood into the air that is exhaled.*

The part of our breathing apparatus with which we are most familiar is the nose. There is much more to the nose than the part that stands out on the face and has two holes, called *nostrils*. The nostrils are lined with skin covered rather thickly with hairs. The hairs are kept moist by the secretions of small glands on the inside of the nose and by tears which first wash the surface of the eyes and then pass through ducts* into one big space which is called the *main nasal cavity*. The nasal cavity is lined throughout with mucous membrane.



By Pictures, Inc., N. Y.

Leaving the bathysphere

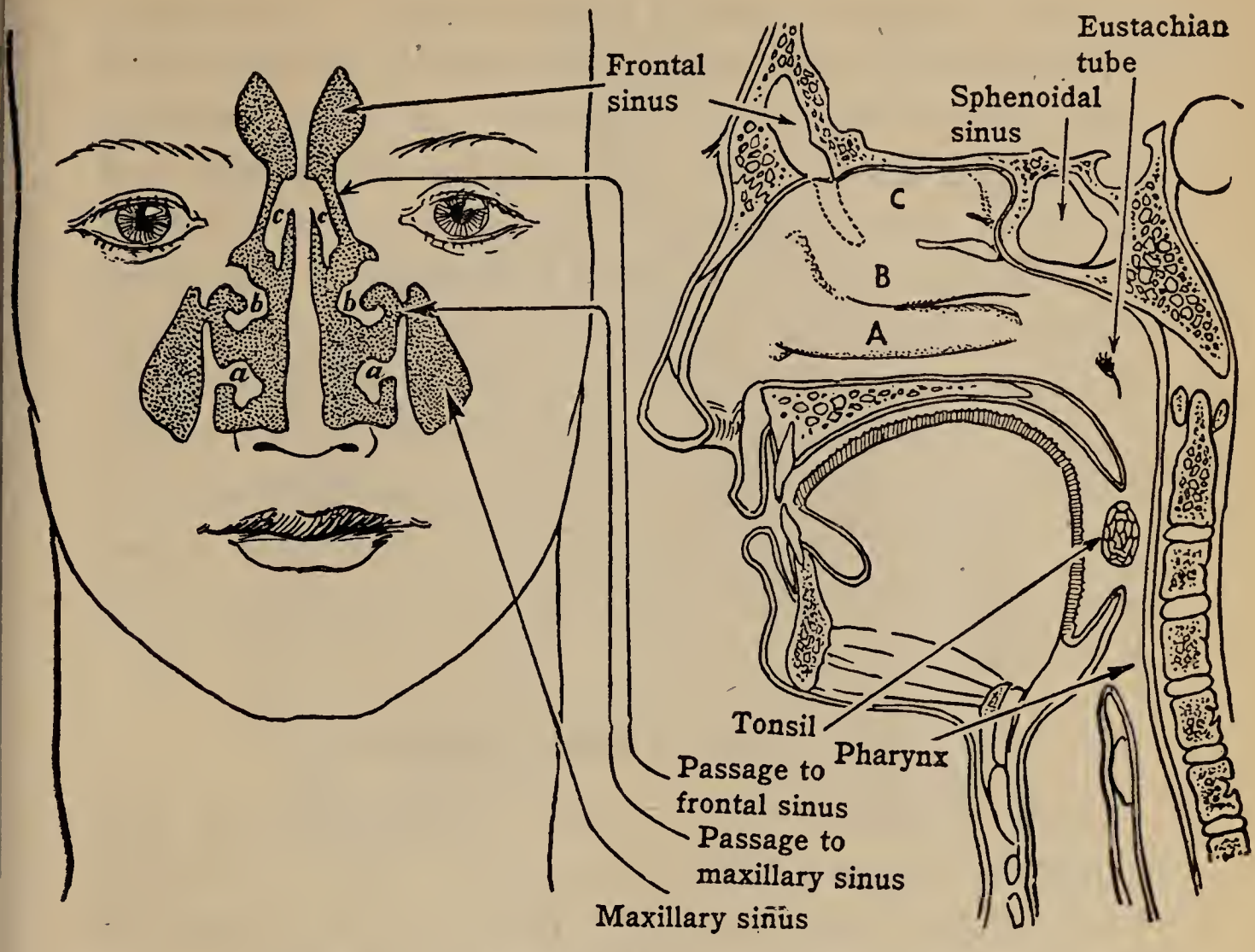
As a breath of air enters the nostrils, some of the dust and germs which are in it are caught on the moist hairs. Then the air is directed toward the upper inside part of the nose to the smelling, or olfactory, region. In the olfactory region are special cells which send messages of odor to the brain.

Next the air is warmed. To accomplish this, a kind of radiator, called *nasal conchae,* exists on each side of the main nasal cavity. Each radiator is made up of three bony shelves covered with a thick layer of blood vessels. The circulating blood keeps these radiators warm so that they can warm the air that passes over them.

Nasal Cavities and Breathing

Besides the main nasal cavity there are smaller cavities lying within the bones of the skull. These smaller cavities are all connected with the main cavity. There is one under each eye. There are three small ones on each side between the eyeball and the nose. There is another big one in the forehead and still another extending up and back into the base of the skull. These keep the eyes surrounded with warm air. They help to keep the brain warm, and they make the bones of the skull hollow and light. If these bones were solid, the skull would be very heavy to carry around.

These smaller cavities are called *sinuses.* Sometimes an infection of the nasal cavity extends into one or more of the sinuses. It may also extend from the lower part of the nasal cavity, or pharynx,



A, B, and C (a, b, and c) are the nasal conchae

Diagram of nasal cavities

into the middle ear. Thus it is wrong to think of a cold as just an infection of the inside of the nostrils. A cold involves a much larger surface than that, and it may easily spread into the throat, the ears, the eyes, and come very close to the teeth and the brain.

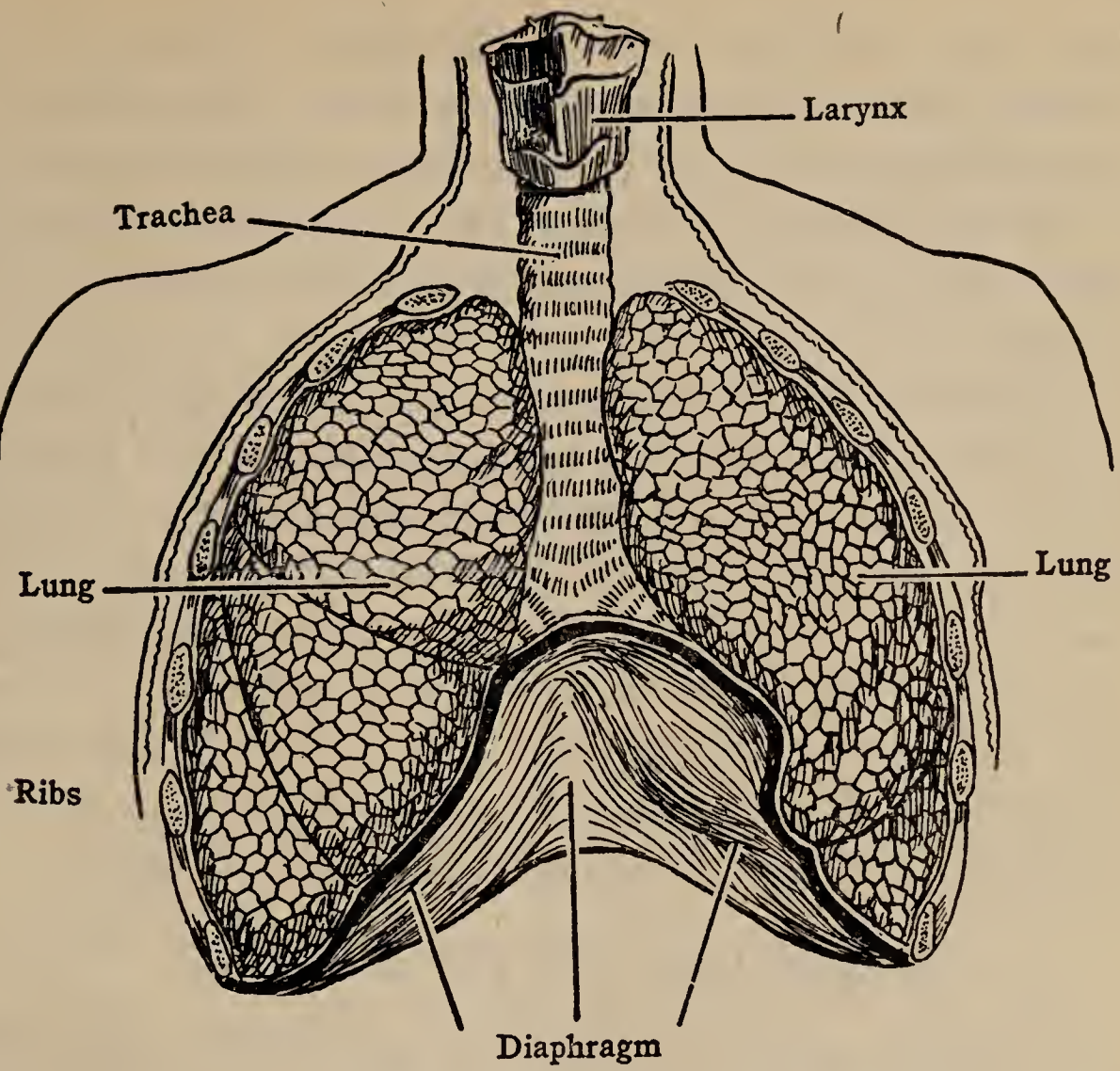
Tonsils and Adenoids

After air has moved through the nostrils and nasal cavities, it passes through the pharynx. The throat is part of the pharynx. On each side of the throat

are soft masses of tissue called *tonsils*. Sometimes the folds of mucous membrane over the tonsils make good places for germs to grow. If these growing germs can break down the mucous membrane and get into the tonsil tissue, the tonsil becomes infected and may have to be removed to get rid of the germs growing in it. At the back of the pharynx above the throat is another bit of tissue somewhat like the tonsils. It may become enlarged and form adenoids. Adenoids are quite likely to interfere with breathing, and if so they must be removed as they may cause severe inconvenience and sometimes even deformity of the jaws.

The Larynx and Trachea

After a breath of air has passed through the pharynx it passes through the voice box, or larynx. You can feel your larynx by placing your fingers on the front of your neck and then swallowing. The larynx moves up and down whenever a person swallows. A small tube which leads from the larynx to the lungs is called the *trachea*. From the larynx the breath of air passes through the trachea and into the lungs. The trachea is held open all the time by bands of cartilage. Cartilage somewhat resembles celluloid. It is movable and springy. Although somewhat like bone, it is more flexible and elastic than bone. The end of the nose is held in shape by pieces of cartilage. The bands of cartilage in the trachea can be felt through the skin of the lower front of the neck.



The respiratory tract

The Diaphragm and Thorax

The lungs are protected by a bony box called the *thorax*. The thorax contains the lungs, the heart, and many blood vessels. The thorax is formed by the ribs and the spinal column, with a tough muscular membrane, called the *diaphragm*, forming the bottom of the box. The diaphragm is a big, dome-shaped muscle which separates the lungs from the digestive organs, which are in the abdomen. The diaphragm is fastened to the lower ribs and the spinal column. The stomach, liver, and other digestive organs fit up

into the dome of the diaphragm. When you breathe, the diaphragm pushes down, the ribs are pushed up and out, the shoulders are pushed up, and air rushes into the lungs keeping them always stretched to fill the spaces made for them in the thorax.

Because air is necessary for life, the body is carefully equipped to take in air under all sorts of conditions. The nose and pharynx are so formed that they will stay open to allow air to get through at all times. It is very unusual for the air passages of the nose and pharynx to be completely stopped. If the nose is stopped, air can get into the body through the mouth, although it will not be so clean or warm as air that is taken in properly through the nose.

Should Boys and Girls Smoke?

Sometime some boy or girl may ask you to smoke a cigarette. Do you know why you should refuse to smoke anything? Tobacco has several poisons in it, the chief one of which is the drug nicotine. Nicotine is especially harmful to anyone who is not grown up.

Smoking may hurt the mucous membrane in your throat. It may irritate your larynx and cause hoarseness or even loss of voice. Many smokers who inhale have a "cigarette cough." Many excellent physicians say that smoking injures the heart. Smoking also may take away your appetite so you will not want to eat very much. You know that if you do not eat enough your body cells will lack nourishment and you will become sick.

Smoking Is Expensive

Smoking is also very expensive. Some people smoke as many as 20 cigarettes, or one package of cigarettes a day. Since there are 365 days in the year, at this rate a person would smoke 365 packages of cigarettes in a year. At the price of fifteen cents a package, a person who smoked 365 packages of cigarettes a year would spend $54.75 a year for cigarettes. Think of all the nice things you could buy with $54.75. So you see there are many reasons why you should not smoke.

How Cartilage Helps

Cartilage keeps the trachea open so that air can easily pass in and out of the lungs. Because the trachea is made in this way, it can move as the neck moves. Cartilage is also found at the front ends of the ribs. The ribs are fastened firmly to the backbone. They then pass down and around and up again and are fastened to the breast bone in front. The front ends of the ribs are entirely made of cartilage. This moves easily when a person breathes and enables the body to assume different positions. It does not break as bone would break when hit or injured.

Some Lung Diseases

In certain illnesses such as pneumonia, and during strenuous exercise, the breathing is speeded up so that the body will get rid of carbon dioxide and get a fresh supply of oxygen.

The breathing structures are especially equipped to remove dust and dirt from the air that is breathed and to keep themselves clean. The air passages from the nostrils far into the lungs are lined with little hairlike structures called *cilia.** These tend to catch much of the dust that is in the air we breathe. By their constant sweeping movements away from the lungs and toward the nostrils, they are able to send out of the body much of the dirt and dust that is breathed. However, in spite of the constant activity of these little body brooms, the lungs of all but a newborn baby contain large quantities of dark substance, called *pigment.* This pigment is nothing more than foreign matter which has been breathed into the lungs. The body can resist the ill effects of most of this foreign material, but some of it causes trouble. Tuberculosis and the common cold are both caused by certain types of foreign matter (bacteria) in the respiratory tract. Tuberculosis causes more deaths of boys and girls between 10 and 19 years of age than any other illness, and the common cold causes twice as many absences from school as any other sickness. To try and stamp out these illnesses—for they can both be stamped out of this country—is one of the great health tasks for boys and girls in this country to undertake and accomplish.

Tuberculosis Takes a Life

At about the time Abraham Lincoln became president of the United States two American boys

By International News Photos, Inc., N. Y.

A modern outdoor school where tubercular children get plenty of fresh air and sunshine

by the name of Trudeau were living in Paris with their grandfather. Edward was the stronger of the two boys and when the French boys at school took advantage of his brother's lack of strength to torment him, Edward took care of him and fought his battles for him. How fine it is to find such a strong affection as existed between these brothers!

When Edward was about seventeen years old, the grandfather, with whom these boys made their home, decided to move back to New York. And these boys, who spoke French better than English, had to become accustomed to American ways.

One of the things in New York which impressed Edward was the way American boys and girls did things together. In France boys and girls were never together except in the presence of an older person. Therefore Edward particularly enjoyed walking, riding, dancing, and skating with groups of young people which included his girl cousins and their friends.

He was fond of out-of-door activities, a fact which later saved his life. He spent his summers in the country where he had his own horse and wagon and his own sailboat. He once said that he "loved every rope on a good boat." It was probably this fondness for boats that made him decide to enter the United States Naval Academy.

Very soon after Edward had entered the Naval Academy, which was then at Newport, his brother's health began to fail and he went to Edward and told him that he had *consumption,* as tuberculosis was then called. There were no trained nurses in those days, and Edward was only too glad to give up everything to take care of the sick brother. The two occupied the same room, and sometimes even the same bed.

The doctor, who came once a week, usually left some new cough medicine and told Edward each time that he must never open the windows as it would aggravate the cough. Of course the cough medicine did not help, and the cough grew steadily worse until the brother finally died in December, 1865.

Tuberculosis Attacks Edward Trudeau

"How strange," wrote Edward many years later, "that after helping to stifle my brother and infect myself through such teaching as was then in vogue,* I should have lived to save my own life and that of many others by the simple expedient of an abundance of fresh air!"

But at that time no one had ever heard of the treacherous little germ that caused tuberculosis, and Edward Trudeau went on about his work quite unconscious that he had caught from his brother the invisible cause of a disease which in those days was considered fatal.

He did not go back to the Naval Academy but tried various other occupations: three months in a school of mines, some time in a broker's office, several other activities in which he was not particularly interested. All this time he kept up his exercise, especially his walking and rowing. Finally after three unsettled years he entered medical school in New York. This kept him indoors more than usual and when, toward the end of the winter, one of his friends laid a wager that he could not walk four and three quarter miles in 47 minutes (from 59th Street to the Battery), he did not stop to think what a severe tax it would be to him physically and that he was completely out of condition. He started out gaily, and his friends were there to see him off. By the time he had gone thirty-six blocks his chest ached and everything he looked at had a reddish halo, but he kept steadily on. He won the wager.

"But," he says, "it did me up badly, and for a long time afterward I felt ill."

All the time the germs of tuberculosis were lurking in his body waiting for his lowered resistance to give them a chance to multiply and spread. The over-fatigue which followed the walk was just what they needed. They promptly developed into a "cold abscess" which had to be operated upon several times before it healed. At that time no one knew that such an abscess was one form of tuberculosis. So Edward Trudeau continued his studies. He worked hard all day and stayed up late at night. He was very thin and worn out when he finally finished his medical course. But he paid no attention to his physical condition. He was married and went to Europe with his wife. While there he noticed swollen glands in his neck. The doctor whom he consulted could not tell him, for he did not know, that such swollen glands were often a sign of tubercular infection. The tubercle bacillus had not yet been discovered, and nobody knew that tuberculosis of the glands and tuberculosis of the lungs, or consumption, were both caused by the same germ. Trudeau noticed that he felt tired all the time and that he frequently had fever, but he paid no attention to these warnings.

Finally his condition grew so much worse that a friend noticed it and sent him to a specialist. The physician carefully examined Trudeau's lungs. "Yes," said the doctor, "the upper two-thirds of the left lung is involved in an active process." The

germs which Edward Trudeau had caught from his brother eight years before had finally spread until they affected two-thirds of his left lung. In those days tuberculosis of the lungs, that is, pulmonary tuberculosis, was considered absolutely fatal.

"I pulled myself together," says Trudeau, "put as good a face on the matter as I could, and escaped from the doctor's office after thanking him for his examination. When I got outside, I felt stunned. It seemed to me the world had suddenly grown dark. The sun was shining, it is true, and the street was filled with the rush and noise of traffic, but to me the world had lost every vestige of brightness. I had consumption, that most fatal of diseases! My rose-colored dreams of achievement and professional success in New York were all shattered!"

What did Edward Livingstone Trudeau decide to do? He decided to go to the Adirondack Mountains in northern New York State, not because anyone at that time thought that fresh air would help tuberculosis, but because he loved the great forest and the lakes and the wild life. He loved to be out of doors and he enjoyed doing the things which kept him out of doors.

One of Trudeau's best friends went with him to a hunting and fishing lodge forty-two miles from a railroad. "From the first," said Trudeau, "I have had the best friends a man ever had." The quiet doctor's personality attracted people to him, and when they became his friends they remained so for the rest of their lives.

A Friendship Is Renewed

One of the friends who came to stay with Trudeau on his first trip to the Adirondacks was Edward Harriman, who later became very well known as a railroad executive. The two men hunted and fished and tramped through the woods together. They lived at Paul Smith's hunting lodge which, though clean and comfortable, had no modern conveniences like bathrooms or furnaces. "A trip to the spring under the bank furnished drinking water," said Trudeau.

Many years later these two men were again together at Paul Smith's. By this time a railroad had been built and Mr. Harriman arrived in his private car. "This is a beautiful private car you have here, and it is certainly comfortable." "Yes," answered Harriman, "but it is not half as much fun, Ed, as the way we traveled about in the old days, that summer at Paul Smith's." Trudeau agreed that the simple life was more fun.

"It was during those early years at Saranac Lake," said Trudeau, "that I met the well-known Adirondack guides Fitz Greene Hallock and Albert McKenzie, and this was the beginning of many happy days spent in the woods with them, and of a lifelong friendship."

Living out of doors did so much for Trudeau's health that he decided to settle in the Adirondacks. He tells of the first winter that he brought his wife and children to Paul Smith's. "We were very comfortable all winter," he said. "The children

would often cry with cold hands and feet while playing on the floor, but they were perfectly well all winter and had none of the troublesome colds which they constantly suffered from in the steam-heated apartment the winter before." Hunting with a guide, Trudeau found, required only a slight exertion and kept him out of doors all day.

Because of his great love of the out-of-doors, Trudeau had unintentionally discovered one of the most important factors in the prevention and cure of tuberculosis. That is fresh air. As one scientist has said, "Tuberculosis is a disease of cattle in barns, not on the range; chickens in coops, not birds in nature; monkeys in zoos, not in the jungle, man in houses, not primitive races."

As Trudeau's health was gradually restored, he again began to practice medicine in a small way. People who heard of his wonderful recovery began to feel that there was something helpful about the mountain air, and they, too, came to live in the Adirondacks and became patients of Edward Livingstone Trudeau, and many of them also improved in health as he had. But these were all people with money enough to rent a house or pay for their room and board and someone to care for them.

Trudeau Builds a Sanitarium

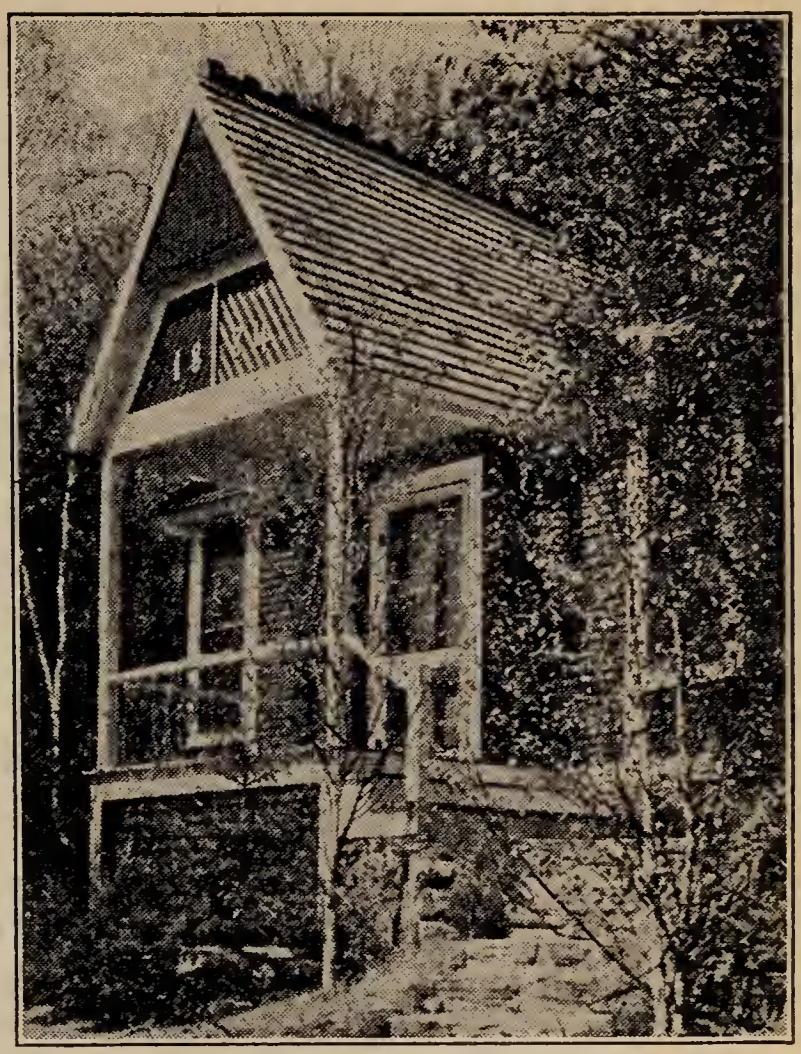
"But," said Trudeau, "there was absolutely no place for the workingmen and women who came here with short purses. It, therefore, occurred to me that a good piece of work could be done in helping

these invalids, for whom my sympathy ever since my brother's death had always been keen, by building a few small cottages where they could be taken at a little less than cost."

He had heard of sanitariums for tubercular people in Europe. They were places where people could live and where a doctor could regulate their daily habits of rest, food, exercise, and fresh air. He wanted very much to establish one in this country but he had no money. He did, however, have time and medical training, and he had many friends.

Trudeau's friends heard that he wished to build a sanitarium, and many of them wished to help. Several guides "chipped in" and bought sixteen acres of land and gave it to Trudeau. They had learned from Fitz Hallock the place which Trudeau thought most suited for a sanitarium. It was a beautiful spot commanding a wide view of the mountains. It was sheltered from the prevailing winds and exposed to the warm sun. It was a place where Trudeau had spent many happy hours hunting. Other friends gave money enough to start the buildings. The first cottage consisted of one room fourteen by eighteen feet and a little porch. It was furnished with a wood stove, two cot beds, a washstand, two chairs, and a kerosene lamp. This is the building which was pictured on the Christmas Seals of 1936. Plain as it was, it was nevertheless the beginning of the sanitarium treatment in America. The first patients were two frail, ill-clad factory girls from

New York City. At home in a crowded tenement nothing could have been done for them.



By Acme, N. Y.

Trudeau's first sanitarium

Trudeau Proves the Germ Theory

While Trudeau was at work starting a sanitarium, Koch, a German scientist, announced his discovery of the tubercle bacillus (the germ that causes tuberculosis). One day a surgeon, who did not believe in germs (you see at that time very little was known about germs) was visiting Trudeau.

"What do you think about germs?" asked the surgeon.

Trudeau replied that he knew that there were such things. He had learned from a pupil of Robert Koch how to take some of the material spit up by tubercular patients, how to put it on a little rectangle of thin glass and stain it so that when it was put under a microscope the germs which were causing the tuberculosis would show clearly as short red rods on a blue background.

"Will you take the trouble to convince me?" asked the visiting surgeon.

"What test do you require?" asked Trudeau.

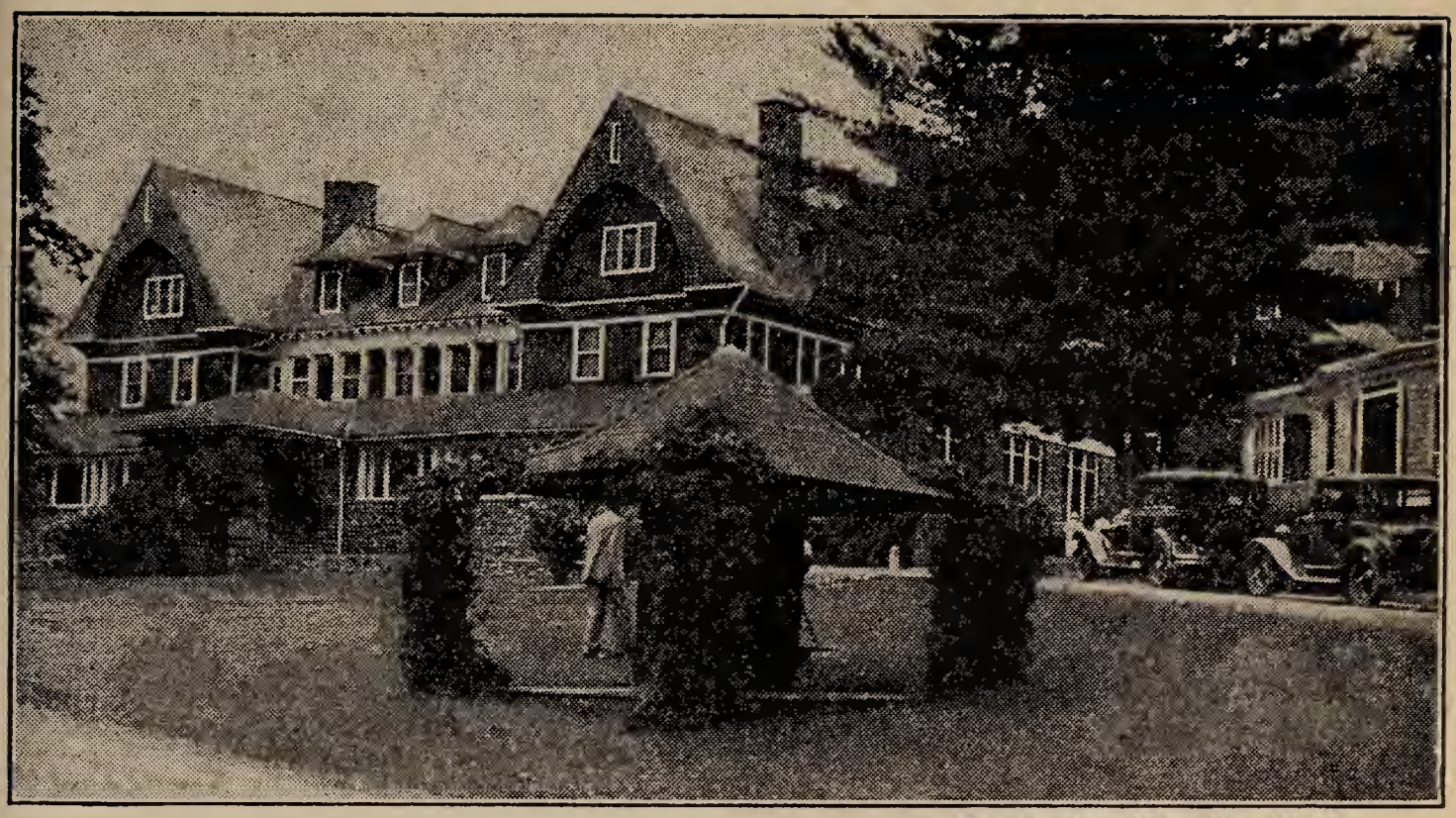
"I will send you," replied the doctor, "five numbered samples, and if you can tell me which ones come from tubercular cases and which ones do not, I will believe it all."

Trudeau agreed to do this, and the man left, evidently thinking that he had Trudeau cornered. In a few days the samples came with only a number on each one. Trudeau examined them under the microscope and reported on them at once. Three contained tubercle bacilli. The man was completely convinced and became an enthusiastic supporter of the "germ theory."

By following Koch's directions, Trudeau learned how to take bacteria from a tubercular patient and grow them in his own home-made incubator. He could then inoculate guinea pigs with the germs and cause the pigs to get tuberculosis, thus proving beyond a doubt that tuberculosis is a contagious disease.

National Association for the Study and Prevention of Tuberculosis

Several years later when the National Tuberculosis Association was founded in this country, Edward Livingstone Trudeau was made the first president. The good that this society has done is shown in part by the fact that since its founding in 1904 the death rate from tuberculosis in this country has dropped



By Keystone View Co., N. Y.

The administration building of the Trudeau Sanitarium

from approximately 200 deaths out of every 100,000 living persons to 55 in 1936.

In the years since Trudeau's death the work of preventing tuberculosis has been going on steadily. Although no serum or vaccination has been discovered which will prevent the disease, it can be definitely prevented by hygienic living and by avoiding infection.

In its early stages, as in Trudeau's abscess and swollen glands, tuberculosis is hard to recognize, but if discovered at that time, the later dangerous stages can be prevented. The best modern method of discovering the presence of tubercular infection is the tuberculin test. This is nothing more than a pin prick. If there is a tuberculous infection in the body, the pin prick will soon be surrounded by a red

spot. This is called a *positive reaction.* A positive tuberculin reaction should always be followed by an X-ray examination. This will show whether or not the lungs are involved. Usually they are not, and ordinary hygienic living with plenty of rest, nourishing food, and fresh air will keep up the resistance and prevent any spread of the infection. If the lungs should prove to be involved, special care is necessary. The best place to get this care is in a sanitarium.

Tuberculosis develops more readily in a person whose resistance is lowered by some other infection of the respiratory tract. Therefore, colds and similar infections should be avoided. Such dangers can usually be prevented if one breathes with the mouth closed, avoids dusty or smoky air, tries to have proper ventilation especially in the bedroom and classroom, avoids crowded busses, theaters, and indoor assemblies, dresses properly for the weather, maintains good posture, gets a sufficient amount of sleep and well-balanced meals, avoids over-fatigue and contact with persons having coughs or colds, and has physical defects corrected. These are all ways of keeping up the resistance and avoiding infection.

To prevent the spread of infectious respiratory diseases a person should cover all coughs and sneezes with a handkerchief, avoid spitting in a public place, keep hands and fingernails clean. He should stay in bed and away from other people when he has a cold.

By Pictures, Inc., N. Y.

Tubercular children getting sunshine

★ The Christmas Seal

Each year at Christmas time you send your gifts to your loved ones. You may have sealed them with cheery-looking little penny Christmas stamps. You probably never have given them much thought. Therefore you doubtless will be surprised to learn about the great health-educational campaign that their sale makes possible and how they help to protect and maintain the health of tubercular children not only in our country but in many countries throughout the world.

The uses to which the money is put cover many fields of activity in fighting disease, but the greatest achievement has been to drive the tuberculosis death rate in the United States down to less than half of what it was in 1907. That year the Christmas Seal was first introduced in this country by Miss Emily

P. Bissell, of Wilmington, Delaware. In 1906 she read an article on the success of the sale of these stamps in Denmark, written by Jacob Riis, whom Theodore Roosevelt called "the ideal citizen." Mr. Riis had first noticed the seals on mail he received from his native Denmark, where the idea originated.

Shortly before the Christmas of 1903, Einar Holboell, of Copenhagen, a young postal clerk, thought it might be a good idea to fix a tax which would help poor and sick children. He interested his superior, the General Postmaster, in a Christmas stamp. This official, in turn, secured the co-operation of many prominent men, among them King Christian IX. The following November 3,000,000 small stamps, costing less than half a penny each, were issued. So great was the demand that 3,000,000 more were immediately sold. From that time the Christmas Seal sale became an established Yuletide custom in Denmark. As time went on the money raised made possible the establishment of more hospitals, clinics, and convalescent homes; also more colonies and camps for city children.

Einar Holboell did not make one cent of profit from his great humanitarian idea, which soon was destined to spread to many nations of the world. His portrait was printed on the 1927 stamp, and he was made postmaster of one of the beautiful suburbs near Copenhagen.

When Miss Bissell read about the wonderful work which was being done in Denmark to combat tuberculosis, she saw in the scheme a means of solving

her own problem. For some time she had been devoting her efforts to nursing tubercular children of Delaware. Her little shack had outgrown its usefulness. She had no money to carry on. Why not sell Christmas seals too?

The first State-wide sale of Christmas stamps in Delaware raised $3,000. Later Miss Bissell interested the authorities of the American Red Cross to launch a nation-wide sale of the penny Christmas Seals. Over $135,000 was netted as a result of the first national sale. The Red Cross carried on the distribution of these stamps annually until 1920. Since that time it has become part of the Christmas program of the National Tuberculosis Association.

As a result of Einar Holboell's inspiration, more than $75,000,000 has been raised in the United States alone. Today State and local agencies and voluntary committees are affiliated with the National Tuberculosis Association, so that even the most remote communities in every State not only do their share but receive support from the Christmas stamps. Their sale in the territories of Hawaii and Alaska and in Puerto Rico also has brought about the organization of community forces to control tuberculosis.

So when Christmas rolls around and again you purchase your penny Christmas Seals, give a little thought to the children of every State who have been and may be helped through their national sales. They have made possible the establishment of sanatoriums, hospitals having tuberculosis departments

which provide for the treatment and prevention of the disease, clinics for diagnosing cases, summer camps, and open-air schools.

Things to Do

1. Have your school doctor, school nurse, or family doctor examine your tonsils and adenoids.

2. Make a list of all the functions (jobs) that the various parts of your body perform when you breathe.

3. Describe the path that the air takes in entering and leaving your body.

4. Place your hands over your ribs, breathe deeply a few times and then tell what happens to your ribs and shoulders as you breathe.

5. Make a list of things you can do to prevent catching colds.

6. Find out how your community helps in trying to stamp out tuberculosis.

7. Make a list of all of the habits you can have that will help to prevent respiratory diseases.

★ 8. If you have time, look up the life of Trudeau and be ready to give a report on him to your class.

★ 9. Find out what the State and community in which you live are doing to help prevent and cure tuberculosis and be ready to give a report to your class.

Do You Know?

On the opposite page are some questions. Study these questions and see if you can answer them.

If you cannot answer any question, turn to the page number following the question and study that page. Then turn back to this page and see if you can answer all the questions.

1. What do poor people in the country have that most poor people in the big cities do not have? (page 141)

2. What did Jane Addams' father say to her when she wanted to wear her new coat to Sunday school? (page 142)

3. What was the ideal for which Jane Addams lived? (page 143)

4. What important health habits did Jane Addams learn in college? (page 144)

5. Why did Jane Addams and her companion, Ellen Starr, establish Hull House? (page 146)

6. How do day nurseries help the health of children? (pages 149–150)

7. Why shouldn't children or grown-ups work in sweatshops? (page 152)

8. Why shouldn't children work in factories? (page 152)

9. How can sweatshops in a city affect people living in the country? (page 153)

10. How does a community playground help the health of children? (page 154)

11. What are some of the evil effects of alcohol? (page 168)

12. What is an epidemic disease? (page 120)

13. What are some epidemic diseases? (page 181)

14. What is meant by *immunity* to a disease? (page 232)

15. How is yellow fever carried from one person to another? (page 184)

16. What is the name of the mosquito that usually carries yellow fever? (page 184)

17. How is malaria carried from one person to another? (page 190)

18. What is the name of the mosquito that carries malaria? (page 190)

19. Can a person have more than one attack of yellow fever? (page 190)

20. Can a person have more than one attack of malaria? (page 190)

21. What effect does malaria have on people? (page 191)

22. What is pneumonia? (page 181)

23. How does yellow fever affect the body? (page 181)

24. What part of your body is affected by pneumonia? (page 249)

25. What are some good rules that can be followed in preventing the spread of contagious diseases? (page 187)

26. Name some communicable diseases that are still prevalent in this country? (page 198)

27. What test can you take that will determine whether you are susceptible to diphtheria? (page 199)

28. How can you be made immune to diphtheria? (page 199)

29. For how long a period of time will this inoculation keep you from having diphtheria? (page 199)

30. At what age should a baby be made immune to diphtheria? (page 199)

31. What is smallpox? (page 199)

32. Why is smallpox no longer the dreaded disease it once was? (pages 200, 212)

33. In taking measures to safeguard yourself against smallpox, what is meant by a *take?* (page 200)

34. What is typhoid fever? (page 200)

35. How is typhoid fever most generally spread? (page 200)

36. What conditions could cause a typhoid epidemic? (page 207)

37. What is a septic tank?

38. How do microorganisms produce other organisms like themselves? (page 220)

39. What are toxins? (page 220)

40. How are toxins in your body produced? (page 220)

41. What does your body do to destroy the effect of harmful toxins? (page 220)

42. Which are probably the most helpful of all bacteria? (page 221)

43. What bacteria that we know exist have we never been able to see even by using the most powerful of microscopes? (page 224)

44. What is a spore? (page 225)

45. How do spores protect bacteria? (page 224)

46. In what ways are diseases most commonly carried? (page 227)

47. What is disinfection? (page 228)

48. What are some common disinfectants? (page 229)

49. Why should pimples never be squeezed? (page 233)

50. What good body habits will help to prevent these skin infections? (page 234)

51. What element taken from the air is necessary to the life of man? (page 242)

52. How is air warmed before it reaches the pharynx and lungs? (page 244)

53. What is cartilage and how is it different from bone? (page 246)

54. What is that part of your body called that is formed by your ribs, diaphragm, and spinal column? page (247)

55. What happens to your ribs, shoulders, lungs, and diaphragm in breathing? (page 248)

56. What is carbon dioxide? (page 243)

57. How does your body rid itself of carbon dioxide? (page 249)

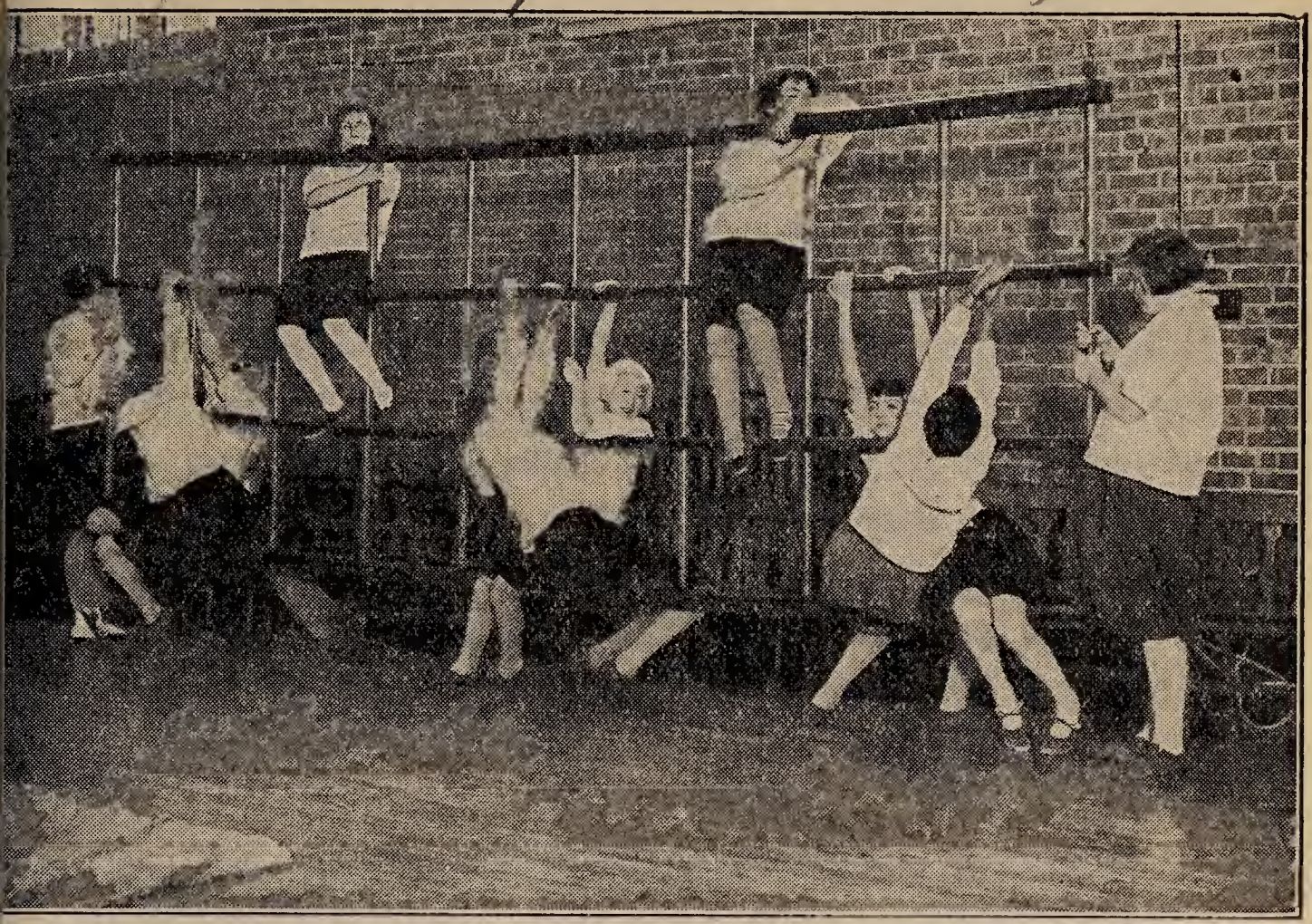
58. What is the respiratory tract? (page 247)

59. What are some diseases of the respiratory tract? (page 249)

60. What is the most dreaded disease of the lungs? (page 250)

61. Why is this disease an infectious disease? (page 260)

62. How can you be certain that your body does not harbor tuberculosis germs? (page 261)



Courtesy Perkins Institution for the Blind

CHAPTER XII

Learning Through the Senses

A Beautiful Baby

In a rose-covered cottage in Tuscumbia, Alabama, a young mother was giving her baby girl a bath. Sunshine, coming through the leaves outside the window made dappled patterns on the floor. The baby reached out her hands toward the light and tried to talk in her baby way. Suddenly she slipped down from her mother's lap and started toward the brightness. It was the first time she had tried to walk alone, and after a few steps she stumbled and

fell. She began to cry and reached up her arms to her mother.

"There, there," her mother comforted her as she took the baby upon her lap again. "Helen is a big girl. Helen can walk alone. She must not cry."

Helen was a beautiful baby. Her full name was Helen Adams Keller. She was a year old the day she began to walk. For the next few months she developed as any healthy, normal child would grow. She walked, and she could say a few words in baby talk. She played in the big garden which surrounded the little cottage. She imitated whatever she saw other people doing and she was greatly loved by her parents.

Helen Becomes Ill

Then sickness came. For days Helen's little body burned with fever. The doctor said that she could not live. Her mother and father watched over her and nursed her tenderly. Then suddenly the fever left. Everyone rejoiced. The child grew strong and well, but something had happened to her. She could no longer form simple baby words, she could only make queer sounds. When people talked to her, she did not turn her head toward them. Her toys did not interest her unless they were put into her little hands. Finally the terrible truth dawned upon her parents. Sickness had left their baby both deaf and blind. She could not speak either, for without hearing she could not imitate the voices of those who talked to her. That is how normal babies learn to speak.

Dark years followed for Helen and her mother and father. As Mrs. Keller went about her household tasks, little Helen clung to her skirts. When she sat down Helen climbed into her lap. The child invented signs with which she could make some of her simple wants understood. She shook her head to indicate "No," and nodded it for "Yes." A pull meant "Come" and a push meant "Go." She learned to fold and put away the clean clothes and she could distinguish her own clothes from the rest.

She does not remember when she first realized that she was different from other people. But she knew it before Miss Sullivan came to teach her. "I had noticed that my mother and my friends did not use signs as I did when they wanted anything done, but talked with their mouths," says Helen Keller in the story of her life. "Sometimes I stood between two persons who were conversing and touched their lips. I could not understand, and was vexed. I moved my lips and gesticulated frantically without result. This made me so angry at times that I kicked and screamed until I was exhausted."

Sometimes after such a fit of temper she would go out into the garden and put her hot cheek against the cool grass. The garden and its flowers were a great comfort to her. There was so little that she could learn and understand in the life about her. Without sight and without speech and without hearing she could at least feel smooth, shiny leaves or delicate petals and smell roses, honeysuckle, and jasmine.

International News Photos, N. Y.

Helen Keller as a child

At one time after her illness the quickness of her nurse saved her from burning to death. Helen had spilled water on her apron and had spread it before the hearth to dry. There was only a low fire, and when the apron did not dry quickly, the child picked it up and threw it over the hot coals. The thin, light material burst at once into flames which set fire to Helen's clothes.

"I made a terrified noise," says Helen, "which brought Viny, my old nurse, to the rescue. Throwing a blanket over me, she almost suffocated me, but she put out the fire. Except for my hands and hair I was not badly burned."

When Helen was six years old, her father took her to Baltimore to consult an oculist.* It was found that nothing could be done for her eyes, but the oculist advised Mr. Keller to see Dr. Alexander Graham Bell in Washington. Doctor Bell is known to most people as the inventor of the telephone, but like his father and grandfather before him, his life work was helping the deaf and dumb to speak. He took Helen on his knee and let her hold his watch. It delighted her to know that he understood her signs.

"I loved him at once," she says. Doctor Bell told her father to begin educating her, and he told him where he could get a teacher. For the rest of his life, Doctor Bell was Helen Keller's friend and adviser. When she was in college she was asked to write the story of her life. She dedicated the book to Dr. Alexander Graham Bell.

Helen Learns to Talk

There is no doubt in Helen Keller's mind, even now, about which is the most important day of her life. It was a sunny, spring day just before she was seven years old. There was much extra activity in the house and Helen sensed from her mother's signs that something unusual was about to happen. No one could tell her and she could not see for herself what was happening. She went to the porch to try to find out.

Two women came into the yard. One of them, evidently a stranger who had just arrived on the train, said, "Where is Helen?"

Helen's father answered, "There she is," and pointed to the doorway. "She has known all day that someone was expected, and she has been wild ever since her mother went to the station for you."

Helen heard none of this conversation, she only felt footsteps approaching and reached out her hands thinking it was her mother. She was gathered into the arms of Miss Anne Sullivan who had come to be her teacher. Miss Sullivan had at one time been almost blind herself, but her sight had been restored.

She had, therefore, a sympathetic understanding of Helen Keller's handicaps and her needs.

In Miss Sullivan's trunk there was a doll for Helen. It had been dressed for her by a blind-deaf girl in Boston. As Miss Sullivan gave it to Helen she spelled into her hand the letters d-o-l-l. This method of spelling words into the hand is in common use among deaf people. It is called the *manual alphabet.* "Anybody can learn the manual letters in a few minutes, use them slowly in a day, and in thirty days of constant use, can talk to a deaf person without realizing what his fingers are doing. If more people knew this, and the friends and relatives of deaf children learned the manual alphabet at once, the deaf all over the world would be happier and better educated."

Miss Sullivan had the difficulty of working with a child who was blind as well as deaf. When she spelled d-o-l-l to Helen, the child imitated and soon learned to spell d-o-l-l back into her teacher's hand, but she did not comprehend that the word referred to the doll which had just been given to her. It was almost a month before Helen learned that everything has a name. It happened like this:

Helen was unable to distinguish between the meaning of m-u-g and m-i-l-k. D-r-i-n-k and w-a-t-e-r also confused her. Therefore, one day her teacher took her out to the pump house and made Helen hold her mug under the pump while she pumped. As the cold water filled the cup and overflowed into the child's hand her teacher spelled w-a-t-e-r into her other hand.

"She dropped the mug and stood as one transfixed," explained Miss Sullivan. "A new light came into her face. She spelled 'water' several times. Then she dropped to the ground and asked for its name and pointed to the pump and the trellis, and suddenly turning round she asked for my name. I spelled t-e-a-c-h-e-r. Just then the nurse brought Helen's little sister into the pump house and Helen spelled 'baby' and pointed to the nurse. All the way back to the house she was highly excited, and learned the name of every object she touched, so that in a few hours she had added thirty new words to her vocabulary."

Learning from Life

From that time on Helen progressed rapidly. She and her teacher walked through the woods, and she learned about the trees, and how the birds build their nests. They went into the fields, and Helen learned how the earth is prepared, the seeds planted, and how the rain and sunshine help the crops to grow. She learned about lilies, tadpoles, shells, insects, frogs, and all nature.

"Thus I learned from life itself," said Helen Keller later. These are almost the same words that were used by William Harvey and John Hunter many years ago and later by Jane Addams. "Don't think, try," wrote John Hunter to Edward Jenner when Jenner had written that he thought he could prevent smallpox. When asked what books a new student would need, John Hunter took the young man into

his laboratory. Pointing to the work being done, he said to the youth's parents, "There are his books."

"I wanted to learn of life from life itself," wrote Jane Addams when she was planning to start a neighborhood house.

It is not the thinking and reading about things that matters most, it is the doing, the actual performing with one's own hands and watching the results. That is where the satisfaction and the greatness lie. A person may be able to answer any number of questions about exercise, sleep, eating balanced meals, enjoying fresh air, maintaining good posture, and prevention of disease, but he should also have had experience with these activities.

A person's life is richer if he uses his body in work and games, if he tries to get enough sleep, if he knows what nourishing meals taste like and how one feels after playing or working out of doors. There is a certain pleasure in knowing what an effort it is to maintain correct posture when sitting as well as when standing. Boys or girls who have been vaccinated for smallpox or inoculated against diphtheria have had an interesting experience which has been denied to other boys and girls. This kind of learning is far more important than just knowing what is in the textbook, and it is more fun. Helen Keller could not learn from textbooks, so until she was older she had to "learn from life itself." That she learned well is shown by the fact that she took a full college course at Radcliffe College with normal girls her own age

Courtesy Perkins Institution for the Blind

Blind children studying geography

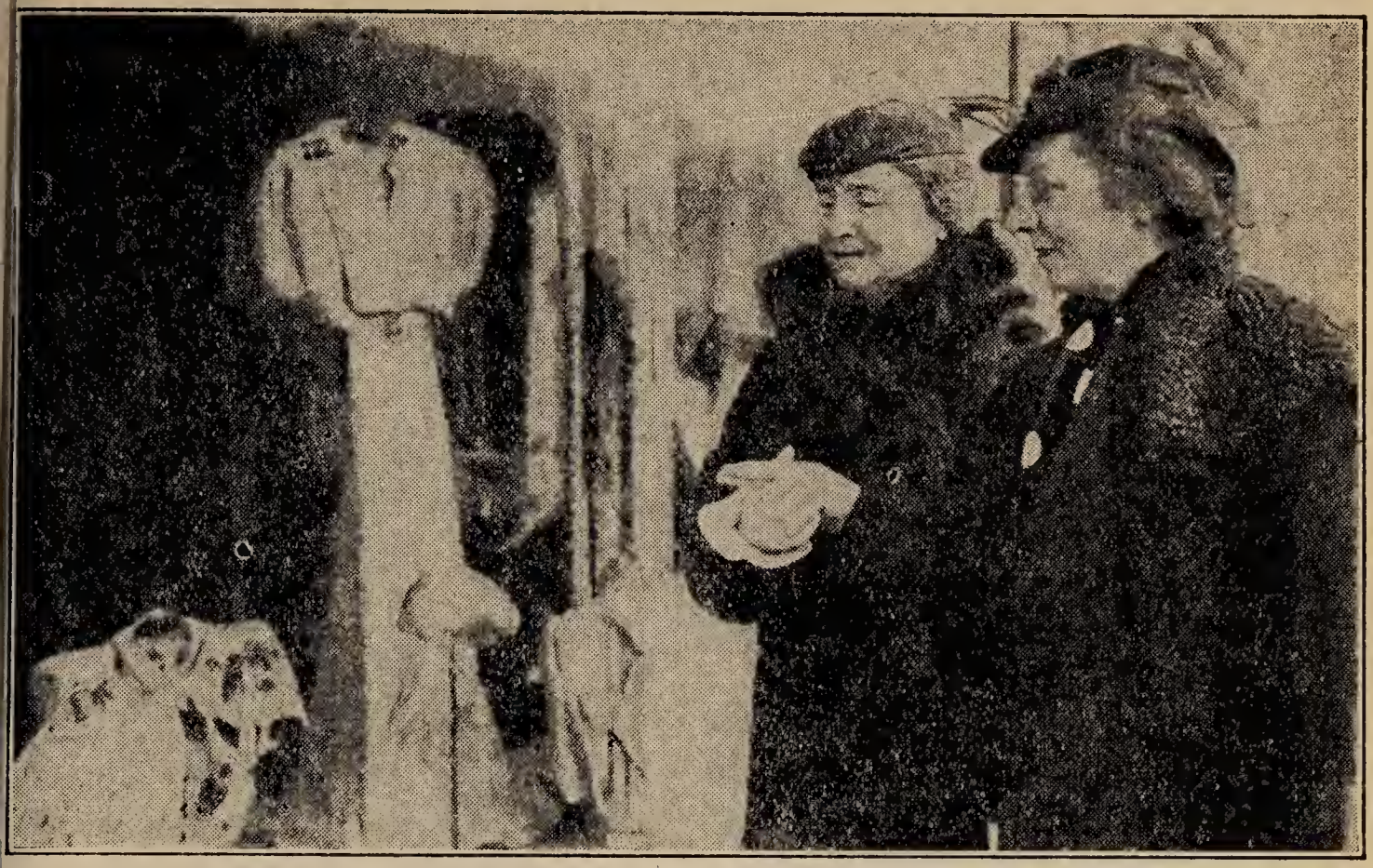
and in the same length of time and was graduated with honors.

Some of her college books were in Braille, the raised print that can be read by the blind with their fingers. Her teacher, Miss Sullivan, went with her to classes and spelled the words of the lectures into her hands. Helen learned to use a typewriter so that she could type her notes and her themes, and they were remarkably free from mistakes although she could never read what she had typed. It was all a tremendous effort for her. While she was in college she once wrote, "The thought that I must spend hours reading a few chapters, while in the world without

other girls are laughing and singing and dancing, makes me rebellious, but I soon recover my buoyancy and laugh the discontent out of my heart. For, after all, everyone who wishes to gain true knowledge must climb the Hill of Difficulty alone. . . . I slip back many times, I fall, I stand still, I run against the edge of hidden obstacles. I lose my temper and find it again and keep it better. I trudge on, I gain a little. I feel encouraged, I get more eager and climb higher and begin to see the widening horizon. Every struggle is a victory."

Few have had to struggle harder than Helen Keller. If her character could be summed up in one word, that word would be *perseverance*. "I never fight," she once said, "except against difficulties." One of her longest struggles was to learn to speak. She is the only deaf-blind person in America who can speak. She not only speaks English, but also French and German. The effort it cost her to master speech is hard to imagine, but she always felt that the satisfaction of accomplishing the feat was worth the effort. Speaking one time in behalf of the deaf she said:

"If you knew all the joy I feel in being able to speak with you today, I think you would have some idea of the value of speech to the deaf, and you would understand why I want every little deaf child in all this great world to have an opportunity to learn to speak. . . . I use speech constantly and I cannot begin to tell you how much pleasure it gives me to do so."



By Acme, N. Y.

Helen Keller window shopping in Paris

Common Causes of Deafness

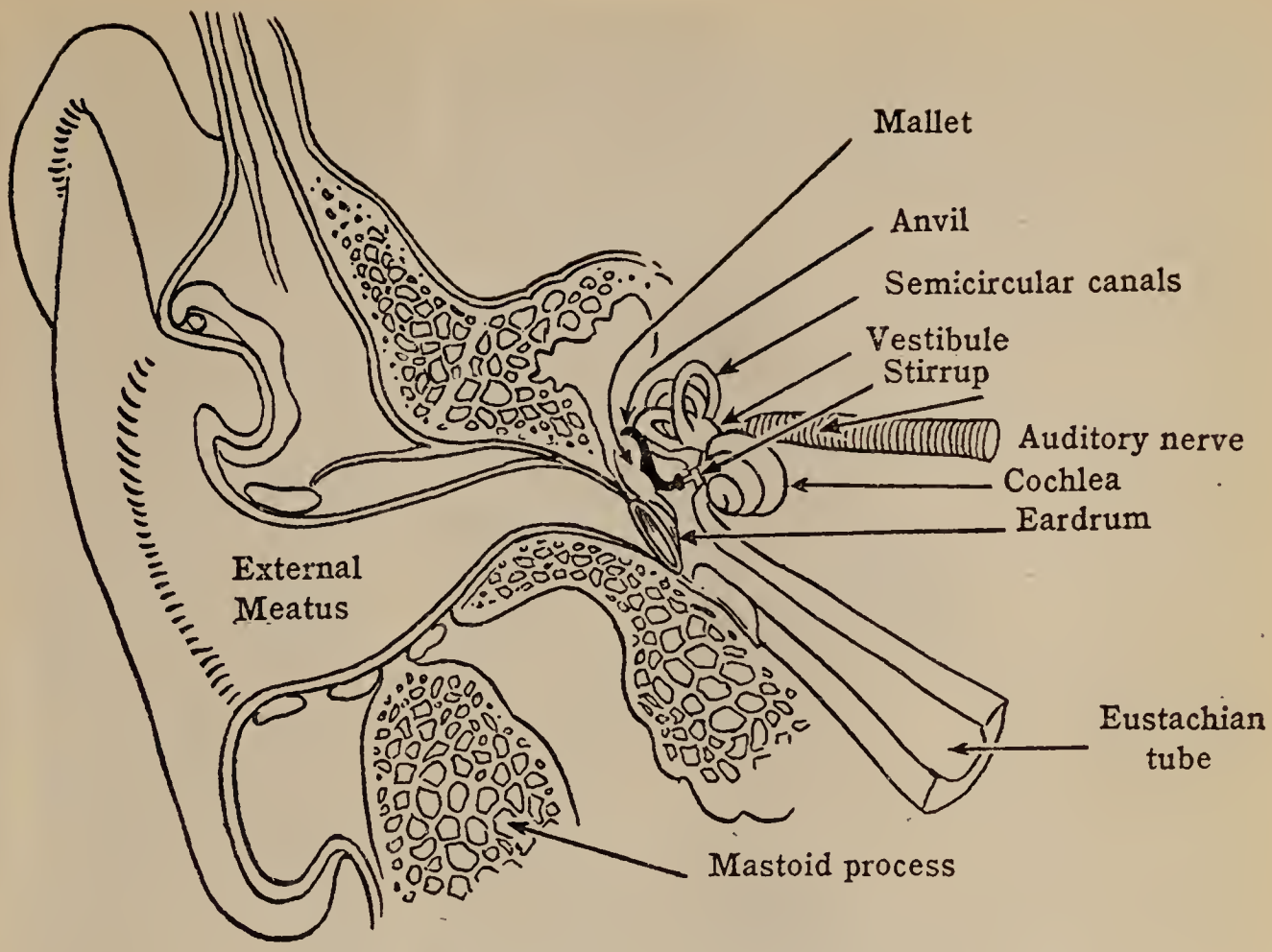
Miss Keller says she feels that a child who becomes deaf before he learns to speak is more greatly afflicted than one who is blind. Learning to speak is very difficult for a deaf child. One of the causes of deafness among small children is sickness. Scarlet fever, measles, diphtheria, grippe,* meningitis, sinus infections, and diseased or enlarged tonsils and adenoids are the diseases most likely to result in complete or partial deafness. Babies should be especially protected against sickness. Diphtheria can be prevented by inoculations. Unfortunately there are not yet any such simple ways to so surely prevent these other

diseases. Observing quarantine is probably the most effective prevention. Staying away from people who have communicable diseases is also necessary. All these diseases start like a common cold. Therefore, one must be suspicious of the symptoms of a cold. Washing the hands often with hot water and soap, keeping hands and other objects away from the nose, mouth, and eyes will help to protect against these diseases. All other hygienic measures are helpful in preventing sickness and its complications.

Some people are born deaf. Injuries cause deafness. Edison was made deaf when, as a boy, his ears were boxed. Deafness may also be caused by foreign bodies in the ear. It is especially dangerous to dig into the ear to remove such bodies, or even to remove the brown sticky secretion which is called *earwax*. Someone once invented a tiny metal spoon with which to remove earwax. This proved to be such a dangerous little weapon that ear spoons have gone out of style. They caused too many cases of deafness. The eardrum is a delicate membrane stretched across the tube which leads from the outer to the middle ear. It is easily injured by an ear spoon or any hard object which gets into the ear. Injury to the eardrum frequently results in total or partial deafness of that ear.

Your Ears and How You Hear

A person can take better care of his ears if he knows how they enable him to hear. Find the



The ear is a complicated apparatus

following parts of the ear on the diagram. Try to locate them in your own ears.

(1) The outer ear, or auricle, which receives the sound vibrations, or waves, and directs them to

(2) the external meatus, or external auditory canal, through which sound waves travel until they reach

(3) the eardrum. The eardrum looks and acts somewhat like a tiny drum. When sound waves hit it, it begins to vibrate.

One can feel sound waves or vibrations by putting the fingers lightly on a bell or any object from which sound is coming. This is the only way Helen

Courtesy Perkins Institution for the Blind

Blind children roller skating

Keller can "hear." By putting her fingers lightly against a person's lips or a violin or a radio, she can feel vibrations and know that there is sound. The vibrations of thunder, footsteps, and many other sounds come to her as vibrations which affect her sense of touch instead of her eardrum.

When a person is not totally deaf, the eardrum catches the vibrations which come to it and passes them on to three little bones which are in the middle ear.

(4) These bones are called, because of their shape, the *mallet,* the *anvil,* and the *stirrup.* By means of these bones the vibrations of sound are carried across the middle ear to

(5) the inner ear where they are changed into nerve impulses and carried to the brain, by

(6) the auditory nerve somewhat as sound waves are caught by a microphone and turned into electric impulses. Unless the impulse reaches the brain, the sound is not heard.

Anything which affects the parts of the body which carry sound waves from the outside world to the brain affects the hearing. To keep the air pressure the same on both sides of the eardrum, an air tube, called

(7) *the Eustachian tube,* passes from the middle ear to the upper part of the throat, or pharynx. Bacteria, as well as air, can pass through this tube, especially if the nose is blown with force. Any infection of the nose, throat, tonsils, or adenoids may pass through this tube into the middle ear.

Such an infection is the cause of earache and running ears. From the inner ear the infection may extend to the hollow bones in which the inner ear is embedded. One of these bones which is often affected is the mastoid bone. This is a serious condition for it is but a step from the inner ear to the brain and entire nervous system. Meningitis is an infection of the nervous system. In meningitis the infection may have traveled from the nose and throat by way of the Eustachian tube and the ear to the nervous system.

Besides

(8) the cochlea and

(9) the vestibule,

there is another part of the inner ear which helps a person to keep his body properly balanced. It is made up of three canals,

(10) the semicircular canals.

Find these on the diagram of the ear. If this part of the ear is affected, a person feels dizzy, although dizziness may also be caused in other ways. It is helpful to recall over and over again how the different parts of the body depend upon one another. Anything which affects the ear may also affect the speech and muscular balance. Seasickness is thought by many to be caused by unusual vibrations which affect the ear.

Caring for Your Ears

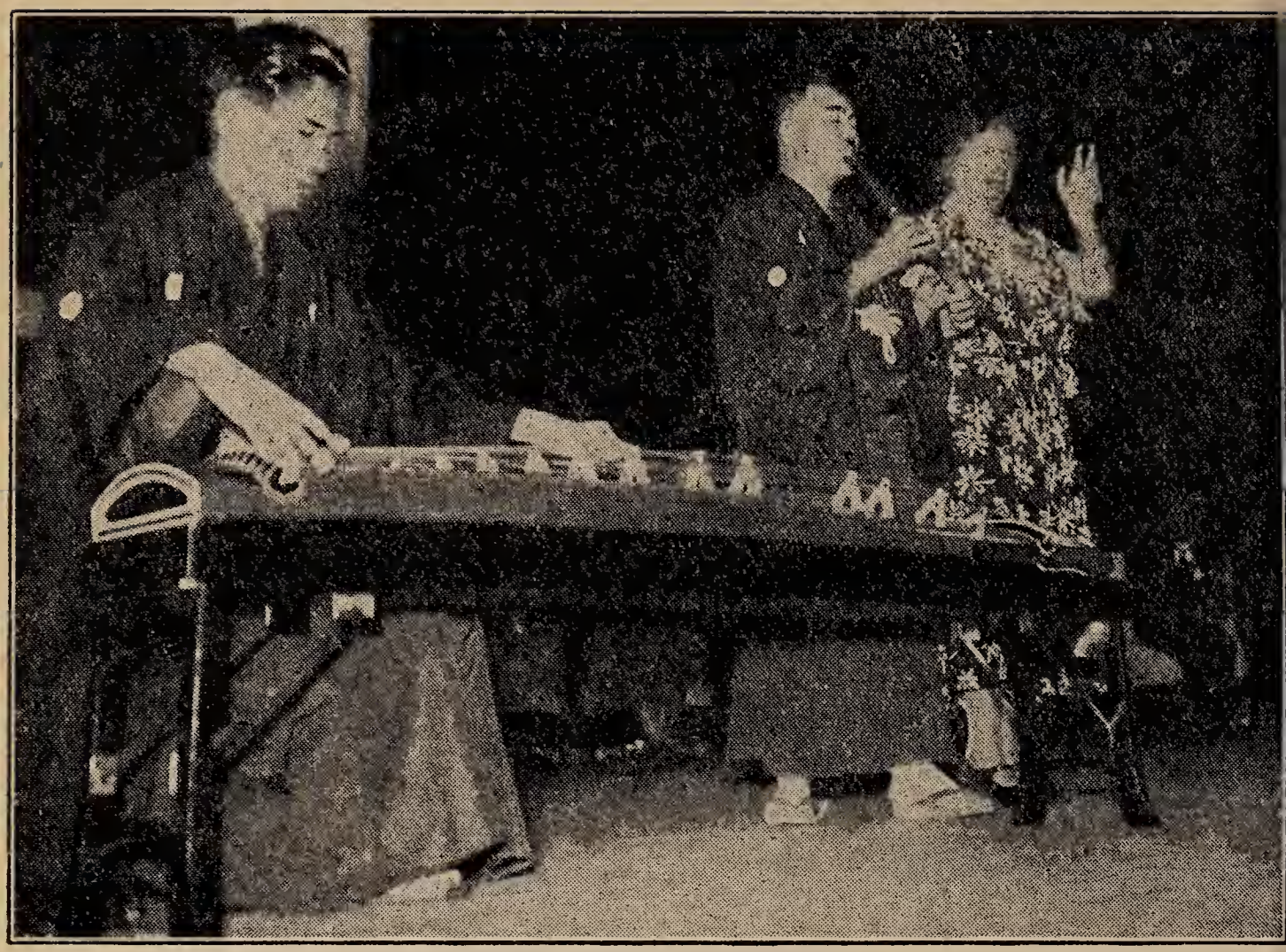
Such important organs as the ears need the best of care. They should be washed carefully with only a

soft cloth. They should be protected when swimming and from infections of the nose and throat. Loud noises and shouting near the ear should be avoided. Diseased adenoids and tonsils should be removed, and a physician should be consulted if there is any strange sensation in the ears. Nothing whatever should be put into the external auditory canal except under the direction of a physician.

"One would think that I had never done anything worth while but the telephone," Doctor Bell once spelled into Helen Keller's hand. He continued, "That is because it is a money-making invention. It is a pity so many people make money the criterion of success. I wish my experiments had resulted in enabling the deaf to speak with less difficulty. That would have made me truly happy."

Helping the Deaf

There are many ways in which others can experience some of the happiness which Doctor Bell felt in helping the deaf. In school deaf children can be placed in a favorable light which will make it easier for them to read the lips of those who are speaking to them. They must not be left out of the work and play of normal children. How Helen Keller appreciated the friends who included her in their conversations! A deaf person who is not blind can be taught to read lips, but those who try to talk to him must remember to look directly at him and speak distinctly. It is important to discover which school children are hard of hearing. A child is sometimes



By Acme, N. Y.

Helen Keller "hears" blind musicians in Japan

considered stupid when he lacks interest and attention only because he cannot hear what others are saying.

"Perhaps it is impossible," says Helen Keller, "for one who sees and hears to realize what it means to be both deaf and dumb." She said that deafness is not a stillness which rests one. It is rather an unnatural silence which makes one feel alone and "out of it." "The silence which deaf people know," she says, "is never broken by a word of greeting, or the song of birds, or the sigh of a breeze. It is a cruel silence which shuts one away from life."

In spite of her handicaps, Helen Keller's life has been as much like that of normal people as she could make it. She is strong and healthy. When in college she thought nothing of taking a ten-mile hike or a forty-mile ride on her tandem bicycle. She was fond of sleighriding and bathing, but rowing a boat with someone else at the rudder was her favorite sport. After she finished college, she and Miss Sullivan had a home near Boston. Here Helen Keller says that she enjoyed helping with the housework. She cleared the table, washed the dishes, and tidied up the rooms. She made beds, picked flowers, started the windmill, and performed many household tasks which kept her on her feet most of the day. She enjoyed this work, she says, because "everyone who loves knows how gratifying it is to be able really to help others through the day's routine."

Using the Sense of Smell

Although experimental tests showed that Helen Keller's sense of smell is just like that of normal people, she uses it much more than the average person uses his sense of smell. For example, she usually knows what part of San Francisco or New York she is in by the odors. She thinks of places by their characteristic odors rather than appearance. In the residential districts she smells delicate food, silken draperies, and rich tapestries. Sometimes as she passes, she can tell what kind of cosmetics the occupants of the house use. She knows if there is an open fire, if they burn wood or soft coal, if they roast

their coffee, if they use candles, if the house has been shut for a long time, if it has been painted or newly decorated, and if the cleaners are at work in it. It was Florence Nightingale who taught people to recognize fresh air from stale air in a house. People are probably more affected by odors than they realize.

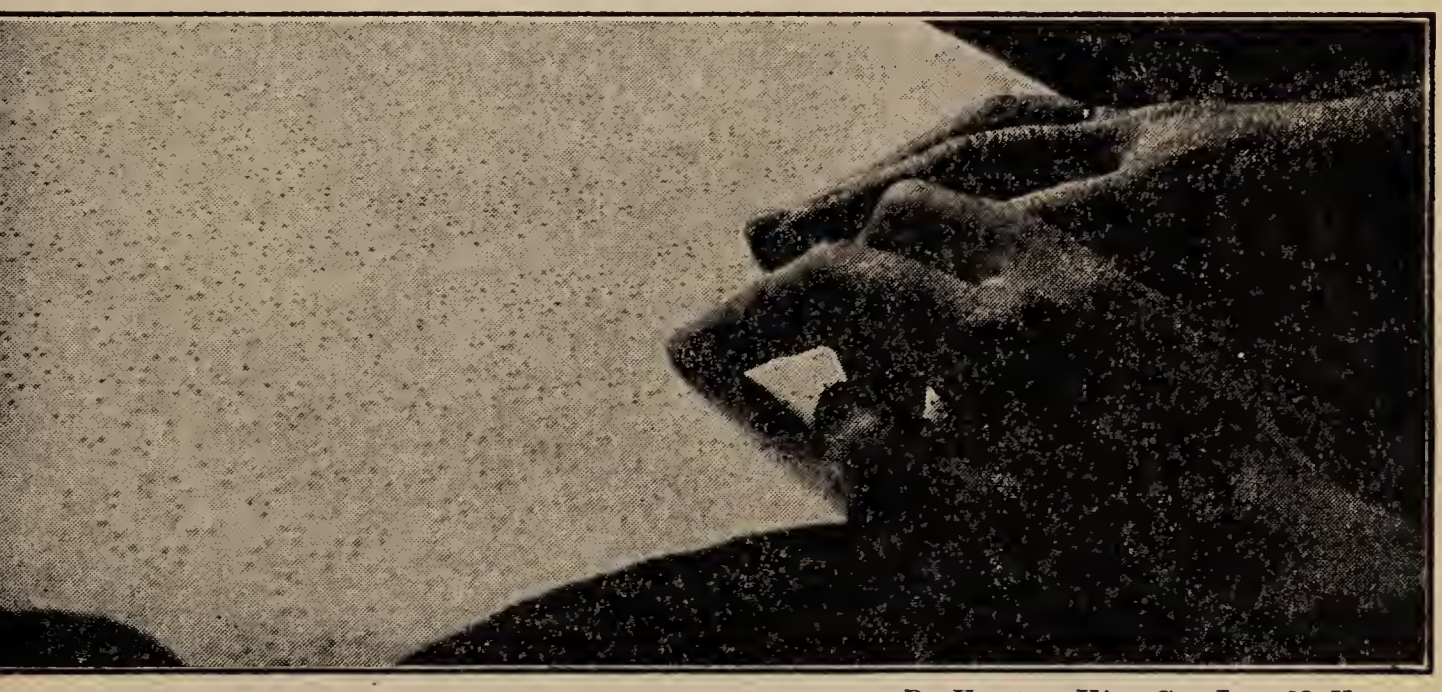
"In small country towns," says Helen Keller, "I smell grocery stores, potatoes, onions. . . . I can easily distinguish southern towns by the odors of fried chicken, grits, yams, and corn bread, while in northern towns the predominating odors are of doughnuts, corned-beef hash, fish balls, and baked beans."

Using the Sense of Touch

After all, a person's entire knowledge of the world in which he lives, is brought to him through his senses. Even more than she uses her sense of smell, Helen Keller uses her sense of touch. She realizes more than most people that the sense of touch is not confined to the finger tips. It extends throughout the body. Scientists have found that there are nerve endings which are sensitive to several sensations besides the usual ones of seeing, hearing, smelling, tasting, and touching. Helen Keller realizes how much valuable knowledge is brought to her through touch and its related senses. By means of these she can distinguish heat, cold, pain, friction, smoothness, roughness, and vibration.

"This sense is the chief medium between me and the outer world," she says.

Books for blind people enable them to read with the sense of touch. This kind of printing is called *Braille.* A page of the book is covered with little raised dots in various patterns. These mean certain words to a blind person as he passes his fingers lightly over them. The method was invented by a Frenchman, Louis Braille, who was blinded by an accident at the age of three years. The number of books which have been printed in Braille is very small compared with the number of books for seeing people. Learning to write Braille with a stiletto is not difficult, and there are many boys and girls who might brighten the hours of the blind by copying stories or poems in Braille for them. There are a number of women in this country who, since the war, have devoted a part of their time to copying books in Braille for blinded soldiers. When this work is donated, the cost of the books is not so great.



By Keystone View Co., Inc., N. Y.

A pupil and teacher reading Braille

Ordinarily a Bible in Braille costs sixty-five dollars and other books cost in proportion. The Moon System is another type of printing for the blind.

Helping the Blind

It was while she was still in college that Helen Keller became interested in the welfare of the blind, and much of her life has been devoted to the prevention of blindness. "I was as deeply interested in the cause of the deaf as I was in that of the blind," says Helen Keller, "and had always thought that deafness before the acquisition of language a greater affliction than blindness. I have not found it humanly possible to work for the blind and the deaf at the same time."

Her first great efforts for the blind consisted in educating people to understand that at least two thirds of the children admitted to the schools for the blind had been blinded as the result of a germ which attacked the eyes of the newborn. This disease can easily be prevented by putting a few drops of silver nitrate or certain other germ-killing solutions into the eyes of all newborn babies and reporting all cases of babies' sore eyes for prompt treatment. After twenty years of effort on the part of Helen Keller and others many States and the District of Columbia have laws requiring that all newborn babies be protected against blindness by the use of a germ-killing solution. In all States reputable hospitals and physicians use this method in all their cases. The result has been a great decrease in blindness, although from ignorance, some babies are still neglected.

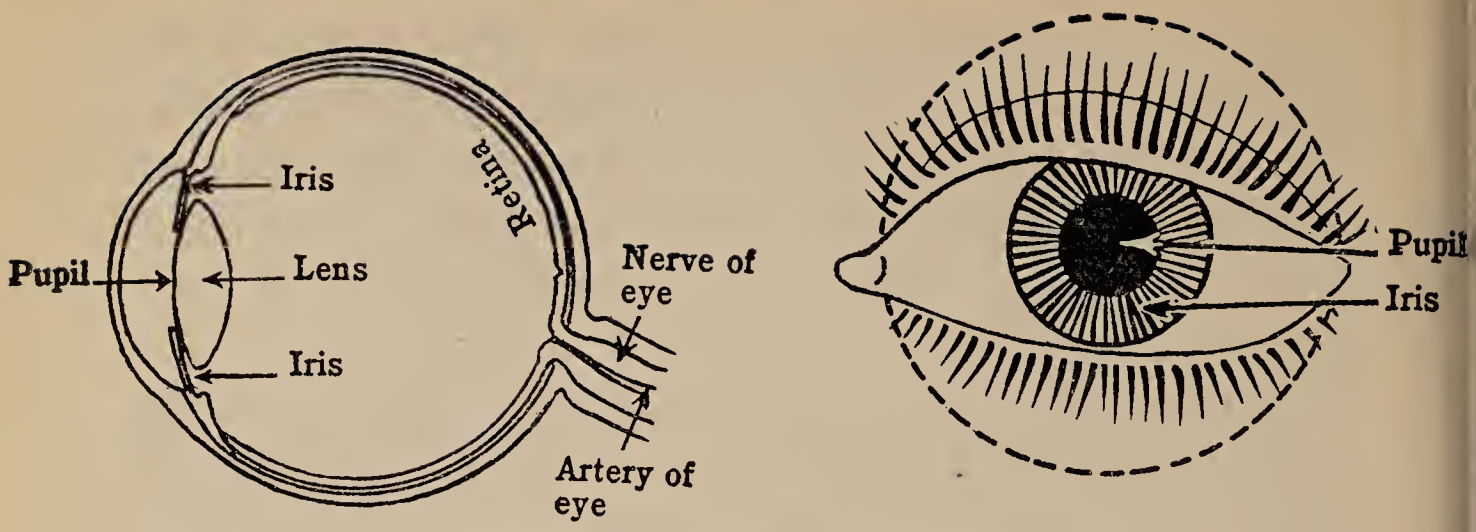
"The happiest moment of my life," says Helen Keller, "was when Mr. Allen, director of the Massachusetts School for the Blind, told me that the day nursery for blind babies which was once full of little sightless ones, with a long waiting list, is now almost empty."

Helen Keller became greatly interested in the work of the National Society for the Prevention of Blindness. It is helping to conserve the sight of large numbers of children who have defective vision, which, if neglected, will develop into blindness. Sight-saving classes are being established in the public schools. The society is investigating the causes of blindness in industry and elsewhere and is getting laws passed to lessen dangers to the eyes from preventable causes.

Your Eyes and Eyesight Dangers

Modern living conditions have added new strains and dangers to eyesight. There is more printed material than ever before. Automobiles, trains, trolleys, and busses carry people long distances. Many people read as they ride. This may strain the eyes. Crowded living conditions cause people to live and work in small, poorly-lighted rooms. Electricity has added to the hours when people can use their eyes. All these problems must be met and solved.

Every boy and girl can, like Helen Keller, help in the work of the National Society for the Prevention of Blindness by preventing blindness in himself and others.

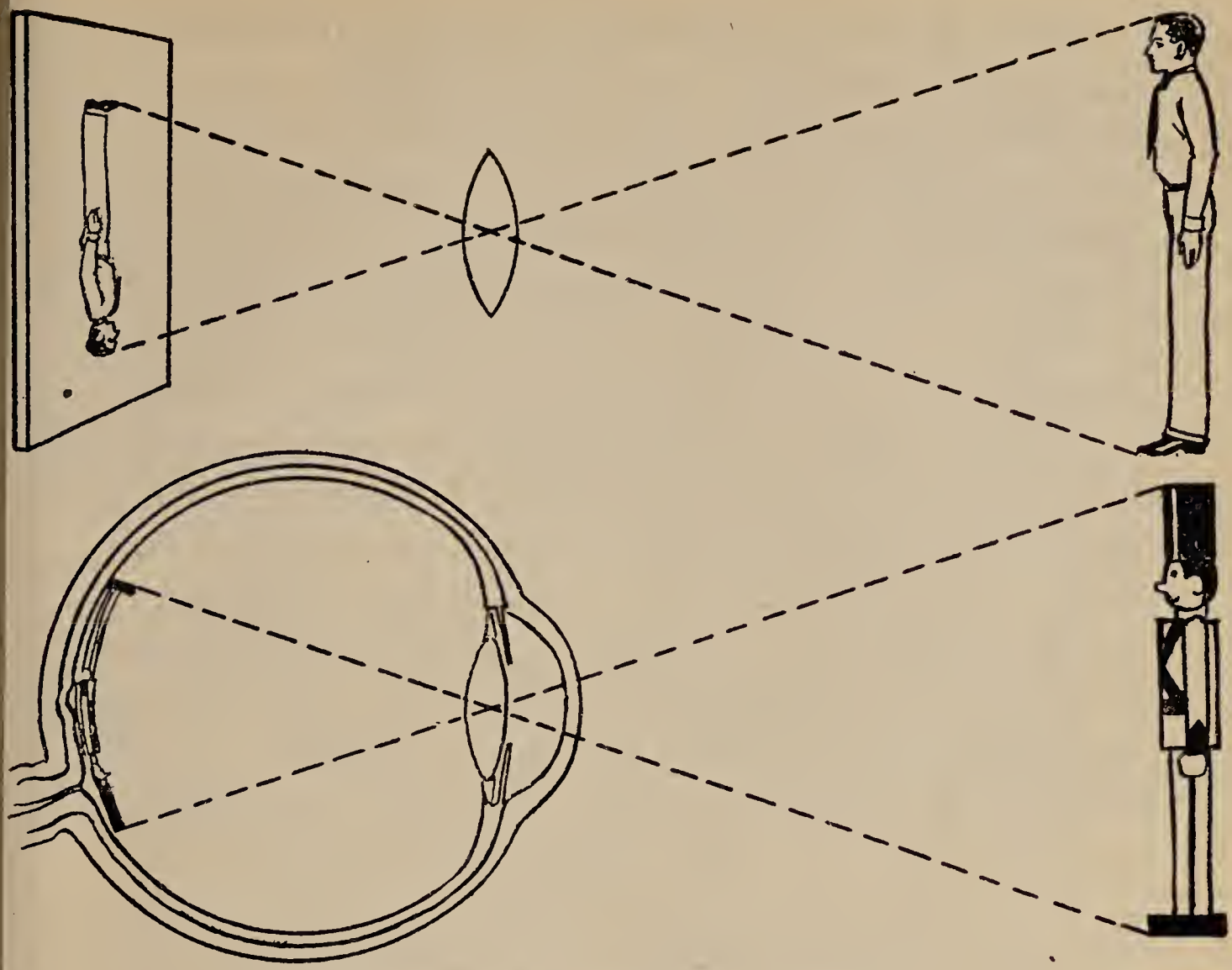


This picture shows the parts of your eye

The diagram on this page shows the delicate parts of the eyes. That on 295 shows how the eye resembles a camera. Anyone who has used a camera knows what adjustments are needed to produce a clear picture with proper light values. The eye is constantly making pictures at different distances and in different light conditions. The delicacy of its structure may thus be partly realized. Because normal eyes work together, an injury to one eye may cause the loss of sight in both eyes, or a weakness in one eye may mean added strain to the other eye. Boys and girls with partial or total blindness can never look forward to driving automobiles.

Care of the Eyes

Sties, conjunctivitis, (inflammation of the edges of the eyelids), pinkeye, and trachoma* are all communicable diseases of the eyes. They may best be avoided by keeping anything dirty away from the eyes, including dirty water for washing eyes. Towels and washcloths used by other people are especially



How your eye resembles a camera

dangerous. Dirty fingers and handkerchiefs most commonly touch the eyes and carry germs. "Granulated eyelids" may be caused by a communicable disease, or they may be the result of eyestrain.

Slight foreign bodies may be removed by using the corner of a clean cloth or handkerchief and hands which have been freshly washed with hot water and soap. Eye injuries or foreign bodies which are difficult to remove should be taken care of by a physician. Such a delicate and important organ as the eye should never be neglected.

Eyestrain may be avoided frequently by wearing glasses, if necessary, and by protecting the eyes during prolonged use. The eyes should be examined by an oculist at the time of the annual physical examination. An oculist is a physician who has had a regular medical course with additional special study of the eye. He understands the relationship between diseases of the eyes and the rest of the body. Optometrists and opticians work with lenses and sometimes fit glasses. If an oculist prescribes glasses or special treatments, his directions should be carefully followed. Glasses are lenses worn before the eyes to aid the natural eye lenses to focus clear images upon the retina.* "Today in New York and indeed everywhere," says Helen Keller, "oculists are spending their lives to make people see better and to ward off blindness. . . . These doctors are helped by an army of nurses who teach the patients how to carry out the doctor's directions. This work in the homes is very important, very necessary, and very costly, but it is work that has to be done."

When using the eyes for reading, sewing, or drawing, the light should be adjusted to fall from the side or over the shoulder. It should not flicker, but be steady. It should be bright enough, not twilight, candlelight, or other dim light, yet it should never be the glare of direct sunlight. Poor posture and reading while lying down strain the eyes. Reading on a moving train or car or when weakened from illness strains the eyes. When reading, sewing, or drawing, a person should form the habit of closing

This child is playing under a good light

the eyes or looking off into the distance about every five minutes.

Just as Byrd's men wore snow glasses to protect the eyes, people should always protect the eyes against the glare on snow, sand, and water and also against dust and wind.

★ The History of Spectacles

Down the ages spectacles have served a double purpose. They have improved the eyesight and have had a marked influence on social customs and dress. Their origin dates back to ancient China. The early spectacle makers believed that there lived in a sacred mountain a "most worthy genius," Cho

Tso. From the earth, they said, he took the crystals and from the mountain stream he procured the golden sands with which he ground the crystals. Sacred tortoises supplied the shells to enable him to make the frames. The wearers were blessed with long life and much good fortune!

About 1285, an Italian monk named Armati made some spectacles. They were single and set in frames of horn or wood. In England, history attributes the invention of spectacles to a celebrated thirteenth-century English philosopher and monk, Roger Bacon. In one of his books he explained how to magnify writing by placing a piece of a sphere of glass on the book with its flat side down.

In the latter half of the fifteenth century, educated Chinese folk, especially the mandarins, wore glasses. The lenses were plain glass, and were used merely to give dignity to the wearer. The more important the individual, the larger were his circles of glass and the heavier and more ornate the horn or shell frames. Those humbler in rank wore glasses with only simple bamboo frames. Whatever the station in life, the method of wearing the glasses was the same. Ear strings, consisting of double straps or thongs, were drawn through loops at the outer edge. By this means the glasses were held in place on the nose.

Up to the time of the invention of printing, in the middle of the fifteenth century, the monks were practically the only people who could read. The printed book was a great stimulus to the demand for spectacles. The trade of making spectacles developed

rapidly in the next century, especially in northern Italy and southern Germany where the glass workers lived.

In addition to many optical shops, street venders and gypsies profited greatly from the sale of cheap lenses. They seemed adept in the manner of present-day high-powered salespeople. They urged the people to wear glasses like the "best folk in town." They claimed that gazing at the sun through green glasses would straighten backs bent with rheumatism! The sun's rays viewed through red glasses would positively aid in removing housewives' corns! Viewing the moon through amber-tinted ones would have a soothing effect upon scolding wives and heartless wife-beaters! These amber glasses when worn in the moonlight, also were supposed to bring about a reconciliation between quarreling lovers!

Marie Antionette, extravagant, fun-loving wife of Louis XIV of France, conceived the idea of inserting her lorgnette into a fan. Thus she started a fashion which had far-reaching effect. Lorgnettes were painted, enameled, and carved at great cost. Many were so small they fitted into crosses, stars, crests, and seals. The gentlemen of that time, not to be outdone by the ladies, carried lorgnettes in the heads of canes, in snuffboxes, and watch fobs.

The invention of the method of grinding a number of lenses together on one large block was made between 1690 and 1693. Benjamin Franklin, about 1784, invented bifocals so that he could see distant and near objects with one pair of glasses. In recent

years there have been great improvements in the construction of bifocals.

The earliest mounts for spectacles were made of horn or leather. These have been displaced by shell or metal. The method of the production of glasses was not greatly improved until the eighteenth century, when the grinding of lenses was done with a better understanding of the principles of the refraction of light. Lenses are made of a clear or rock-crystal glass, ground to suit the defect of the eye. For nearsightedness a concave glass is used; for farsightedness, a convex* lens. Cylindrical lenses were rarely prescribed by opticians until some time near the end of the nineteenth century. Just think how many people would be handicapped if they did not have spectacles.

Things to Do

1. Write a list of the diseases that might cause a small child to become deaf.

2. Write a list of the things you can do to prevent yourself from getting a disease.

3. Get a bell and ring it. Can you feel the sound waves or vibrations?

4. See if you can feel the sound waves or vibrations in your radio at home.

5. Make a list of ten parts of an ear.

6. Be ready to tell your class what each one of the ten parts of your ear is used for.

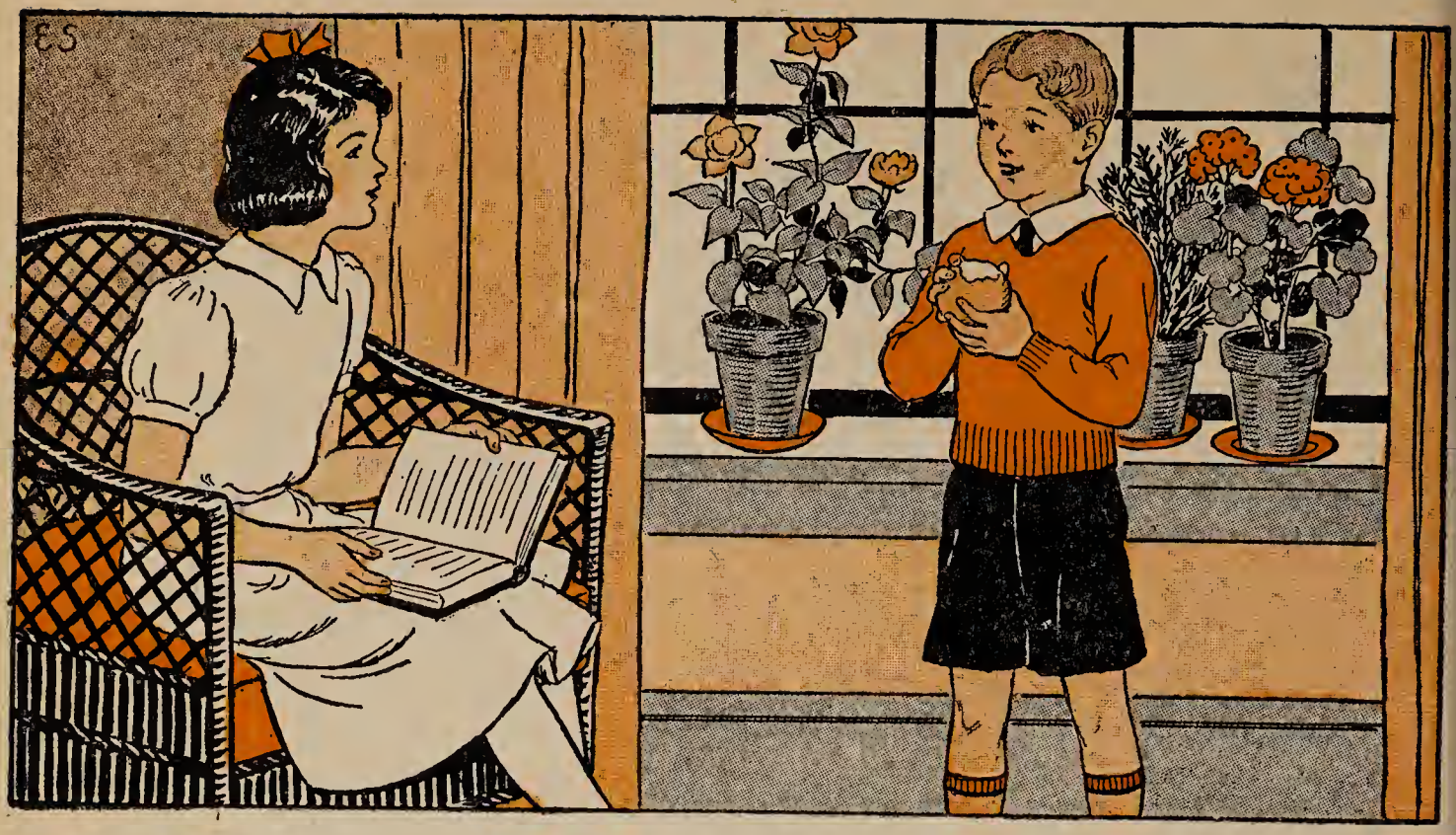
7. Be ready to tell your class how one should take care of one's ears.

8. Make a list of the things you should not do to your eyes.

9. Make a list of the things you should do to protect your eyes.

★ **10.** See if you can get a book written in Braille and bring it to school to show your class.

★ **11.** Write a special report on the education of the blind or the deaf and dumb. Be ready to read your report to your classmates.



CHAPTER XIII

Knowing Yourself

What Happens to the Apple?

Five-year-old Steve came into the room where his older sister sat reading. In his small fat fist was a half-eaten apple. He was chewing hard, but his manner was thoughtful.

"Sis," he began as soon as he had swallowed part of the bite of apple in his mouth, "what happens to the apple after you swallow it?"

For five years Steve had been eating food. In his body it had been digested and taken up by the blood. In the blood stream it had been carried to the cells of his body. All this had been going on smoothly and regularly without Stephen's knowing

anything about it. Food had built and kept going the very parts of the body which Steve now used to ask his sister what was happening inside him.

In answering Steve's question his sister told him about his teeth, his digestion, his circulation, and the billions and billions of cells of which he was made. She wished he were old enough to realize how for hundreds of years men had worked untiringly to learn, little by little, the mysterious secrets of the human body.

One of these workers was William Harvey.

Harvey Discovers the Circulation

Over three hundred years ago a small man bent over his writing table. His attitude was that of a scholar, and from his clothing and from the richness of his surroundings, he appeared to be an Englishman of the wealthier class. He was writing a letter, using a quill pen and expressing himself in Latin as was the custom in those days. His famous words have been preserved for us.

"In my printed book," he wrote, "I do, indeed, assert that the blood is incessantly moving out from the heart by the arteries to the general system, and returning from this by the veins back to the heart, and with such an ebb and flow, in such mass and quantity that it must necessarily move in some way in a circuit."

With these words William Harvey, an English physician, was trying to explain to Caspar Hofman, a distinguished German professor, the exact results

of long years of study on the heart and circulation.

Today almost every schoolboy and girl knows the general functions (work) of the heart, arteries, veins, and capillaries. Three hundred years ago the most learned men did not understand the circulatory system. They did not know that the heart pumped blood through the arteries and capillaries and the veins, back to the heart, from which it was again pumped throughout the body. Some of them boldly declared that the function of the heart was to make heat and "vital spirits," whatever that meant. They said that it was breathing which forced blood through the blood vessels. They could not understand why there was bright colored blood in the arteries and dark colored blood in the veins. The fact that the same blood was pumped over and over again was not recognized by anyone. Then came William Harvey.

He was born in England. He was the eldest of a large family. Because he lived so long ago there are no records of his boyhood. He decided to study *physic,* as the art of healing was then called, and he chose the best school of the time, which was in Italy.

Harvey Studies Animals

Very soon after returning from school in Italy, he set out to discover the truth about the circulation. In the introduction to his book, Harvey explains that he did not learn of the circulation from books but from nature. He examined snakes, eels, frogs,

fish, and shrimp. He compared the heart and blood vessels and lungs of one with the heart and blood vessels and lungs of another. He went to the butcher shop and watched what happened when animals are slaughtered. Drawing off some of the blood of sick people was very popular treatment at that time. Harvey studied very carefully what happened when a band was tied above an incision completely to cut off the blood supply, and when it was loosened to let part, but not all, of the blood flow through. He examined thin people whose blood vessels stood out so that he could easily see them. Few operations were done in those days, but he carefully observed the blood supply in those accident cases and amputations which he did take care of. From all these careful and accurate observations he concluded that the heart acts like a pump in which the heart muscles squeeze the blood out into the arteries with great force. He saw that the arteries branch into smaller and smaller divisions until blood is carried to every tissue of the body. Harvey did not understand just what happened to the blood after it left the small arteries. He could not know about the capillary system because in his day there were no microscopes strong enough to magnify capillaries so that they could be seen. This fact, however, makes his reasoning all the more brilliant.

He could not trace the network of capillaries through the tissues, but he was sure that after the blood left the smallest arteries, it permeated the tissues of the body. From the tissues he knew it

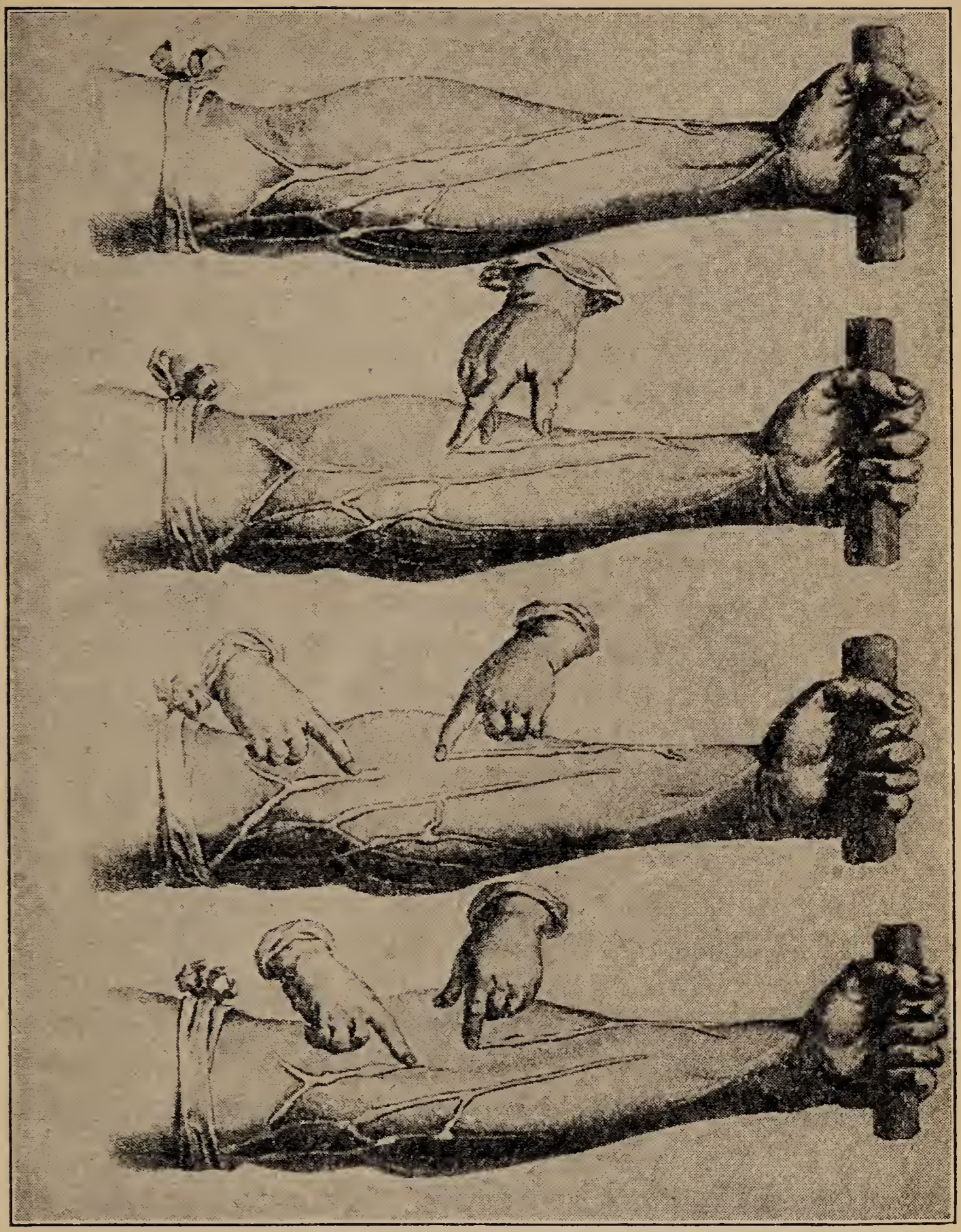
was collected into the smallest veins and flowed through them back to the heart. From the heart it was again pumped throughout the body.

Vein Valves

His teacher in Italy had discovered that there are valves in the veins, but he did not know why. Harvey worked out the exact way in which these valves keep the blood from flowing backward in the veins. "The discoverer of the valves did not rightly understand their use," says Harvey, "the valves are solely made to prevent blood from passing from the greater into the lesser veins where they would either rupture them or cause them to become varicose (swollen with blood)."

The easiest way to describe the valves in the veins is to use Harvey's own words:

"In many places two valves are so placed and fitted that when raised they come exactly together in the middle of the vein, and are there united by the contact of their margins; and so accurate is the adaptation, that neither by the eye nor by any other means of examination can the slightest chink along the line of contact be perceived. . . . The effect of this arrangement is plainly to prevent all motion of the blood from the heart, whether it be upward toward the head, or downward toward the feet, or to either side toward the arms, not a drop can pass; all motions of the blood, beginning in the larger and tending toward the smaller veins, is opposed and resisted by them (the valves); whilst the motion



By William Thompson, Saugerties, N. Y.

An old chart used by Harvey

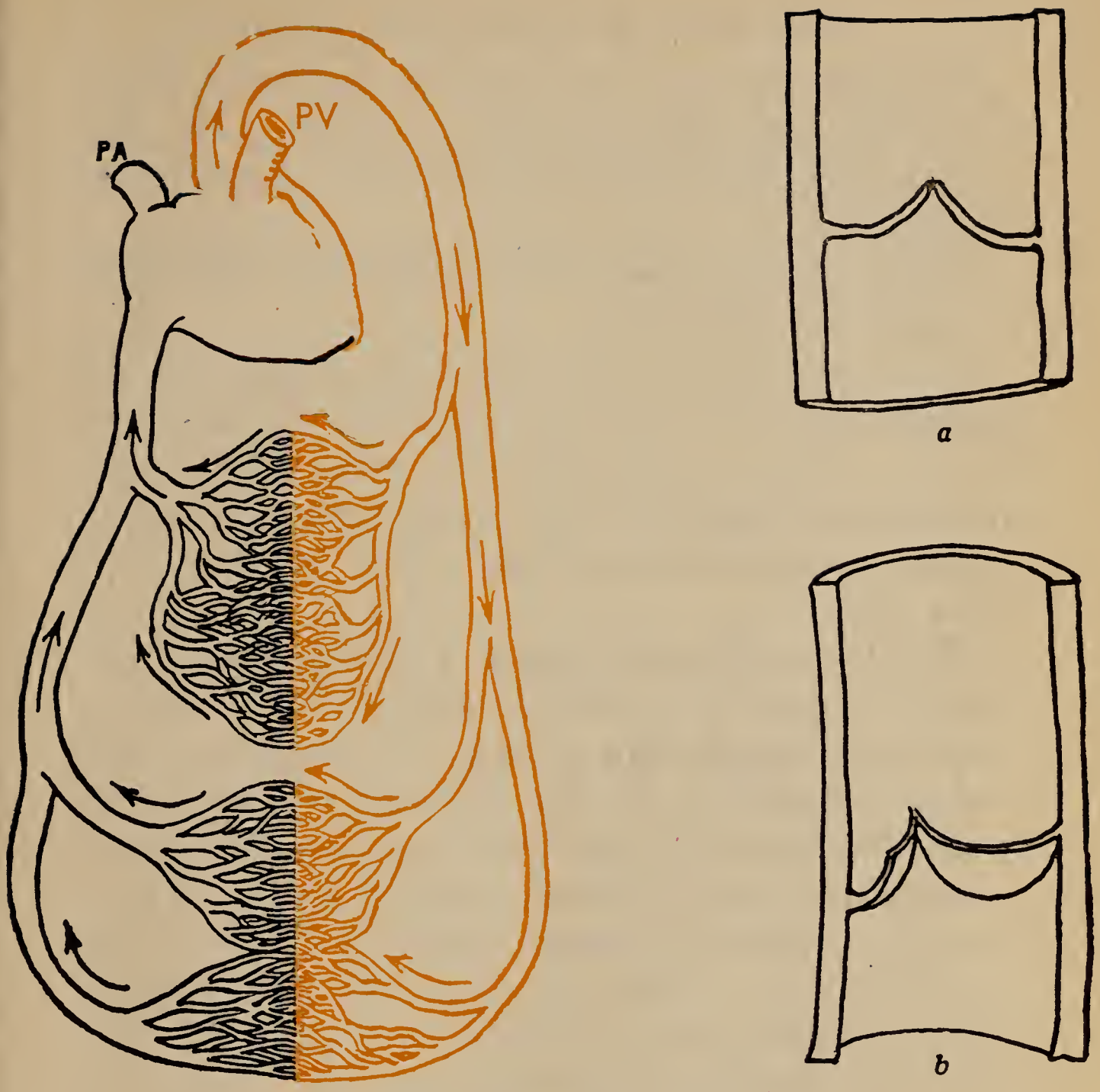
that proceeds from the lesser into the larger branches is favored, or, at all events, free and open passage is left for it." These valves are shown on page 309: *a* is closed; *b* is open.

Harvey worked on this problem of the circulation for more than twelve years before he had his results published. His work was so simply done and so clearly explained that it was immediately accepted by the younger men of his time. Only some of the older ones had to be convinced.

How the Blood Circulates

In the illustration on page 309 the arrows show how the blood is pumped by the heart into two main arteries. One of these carries it to the lungs to take up oxygen. It flows back to the heart and is again pumped through the other artery to all the tissues of the body to carry oxygen and food to them and to take away waste materials. Other arrows show how the blood flows through the veins back to the heart.

Harvey's work on the circulation made him the greatest doctor in England at that time. He was, therefore, made physician to the king. He also attended many of the courtiers. He accompanied Thomas Howard, Earl of Arundel, on a trip to Germany. On this trip the Earl complained that Harvey was always "making excursions into the woods, making observations of strange trees, plants, earths, etc., and sometimes like to be lost." It was during this trip that Harvey wrote the letter to



How the blood circulates

PV is the vein from the lungs. PA is the artery to the lungs.

Caspar Hofmann. It is reported that Harvey accepted an invitation to visit Hofmann in Nuremburg and make a public demonstration of his views on the circulation and that he succeeded in convincing all present except Hofmann.

John Hunter Studies the Teeth

John Hunter was one of the first persons to study the teeth and describe their structure. He also made excellent drawings with which to illustrate his descriptions.

When he was a boy John Hunter was interested in the world about him.

"I wanted to know all about the clouds and the grasses," he said, "and why the leaves changed color in the autumn; I watched the ants, bees, birds, tadpoles, and caddisworms; I pestered people with questions about what nobody knew, or cared anything about."

When John Hunter became a young man he was taught surgery by his older brother, William Hunter. Along with his practice of surgery he kept up a very active interest in all kinds of animals. He was a great collector, and many boys and girls would have enjoyed visiting his strange country home. There, instead of collecting stamps, coins, or objects which would be easy to care for, John Hunter collected living animals, for he wished to experiment with them and observe their habits.

At one time he was known to have in his garden buffaloes, which he sometimes put in harness and drove through the streets of London, rams, sheep from Turkey, and a goat from the East Indies. He kept fowls, ducks, geese, pigeons, rabbits, pigs, opossums, hedgehogs, a jackal, a zebra, an ostrich, and even leopards; also dormice, bats, snakes, and birds of prey. He had a beautiful small bull which

he received from the Queen and with which he used to wrestle in play.

One day two leopards which were kept chained in an outhouse broke from their confinement and got into the yard among some dogs, which they immediately attacked; the howling this produced alarmed the whole neighborhood. Mr. Hunter ran into the yard to see what was the matter and found one of the leopards getting up the wall to make his escape, the other surrounded by the dogs. He immediately laid hold of them both and carried them back to their den. As soon as they were secured and he had time to realize what a risk he had taken, he became so excited that he almost fainted.

John Hunter did not keep this strange collection just for fun. Like William Harvey and the great scientists who have added to our knowledge of the human body, John Hunter was constantly putting questions to nature. Then carefully and honestly and, as accurately as possible, he recorded what he saw. He compared the working of the bodies of animals with the workings of the human body. Thus he added much to our knowledge of anatomy, or how the body is made, and physiology, or how the body lives and acts.

His observations on the teeth are just a small part of the anatomy and physiology which he learned from observation. He had little patience with reading. He preferred to find out facts for himself rather than read them in books. He was a true and thorough scientist.

John Hunter became the greatest surgeon of his time and Surgeon Extraordinary to King George III. John Hunter is often called the Father of Surgery.

How Your Teeth Grow

It was in May, 1771, that John Hunter published the first part of his "Treatise on the Teeth." That was before there was a United States. This country was still ruled by England. Here are some of the facts which Hunter discovered and set forth in his Treatise:

"Before we enter into a discussion of the teeth themselves, it will be necessary to give an account of the upper and lower jawbones in which they are inserted.

"The lower edge of the upper jawbone terminates* in a thick edge, full of sockets for the teeth. This edge is called in each bone, the *alveolar process.*

"The roof of the mouth is a partition between the mouth and the nose.

"The lower jaw is extremely movable. Upon the upper edge of the body of the bone is placed the alveolar process, a good deal similar to that of the upper jaw.

"A tooth is composed of two substances; namely, enamel and bone. (Since Hunter's time the name *dentine* has been given to the substance which he called *bone.* A substance called *cement* has also been discovered on the outside of the roots of the teeth.)

"The enamel is found only upon the body of the tooth and is there laid all around on the outside of the bony, or internal, substance. It is by far the hardest part of our body. The enamel is thickest on the grinding surface and on the cutting edges or points of the tooth and becomes gradually thinner on the sides as it approaches the neck, where it ends.

"The other substance of which the tooth is composed is bony but much harder than the most compact part of bones in general. This substance (now called *dentine*) makes the interior part of the body, the neck, and the whole root of the tooth.

"Every tooth has an internal cavity which extends nearly the whole length of its bony part. It opens or begins at the point of the fang (or root) where it is small; but in its passage it becomes larger and ends in the body of the tooth. . . . This cavity appears to be filled with blood vessels and, I suppose, nerves, united by a pulpy or cellular substance.

"The general shape and the situation of the teeth are obvious. . . . Their number in the whole, at full maturity is from 28 to 32.

The Two Parts of a Tooth

"Each tooth is divided into two parts, namely, first the body or that part of it which is thickest and stands bare beyond the alveoli (edge of bones) and gums; secondly, the fang, or root, which is lodged within the gum and alveolar process; and the boundary between these two parts, which is grasped

by the edge of the gum is called the *neck* of the tooth.

"The teeth in each jaw are commonly divided into classes. From considering some circumstances of their form, growth, and use, I choose to divide them into the four following classes:

1. incisors, commonly called *face teeth*
2. cuspidati, vulgarly called *canine*
3. bicuspides, or the first two grinders
4. molars, or the last three teeth.

"The number of each class in each jaw, for the most part, is four incisors, two cuspidati, four bicuspids, and four, five, or six molars.

"The teeth serve principally for mastication,* and that use need not be further explained.

"They serve likewise a secondary or subordinate purpose giving strength and clearness to the sound of the voice, as is evident from the alteration produced in speaking, when the teeth are lost.

"The teeth are subject to disease as well as other parts of the body.

Caring for Teeth

"The importance of the teeth is such that they deserve our utmost attention, as well with respect to the preservation of them when in a healthy state, as to methods of curing them when diseased."

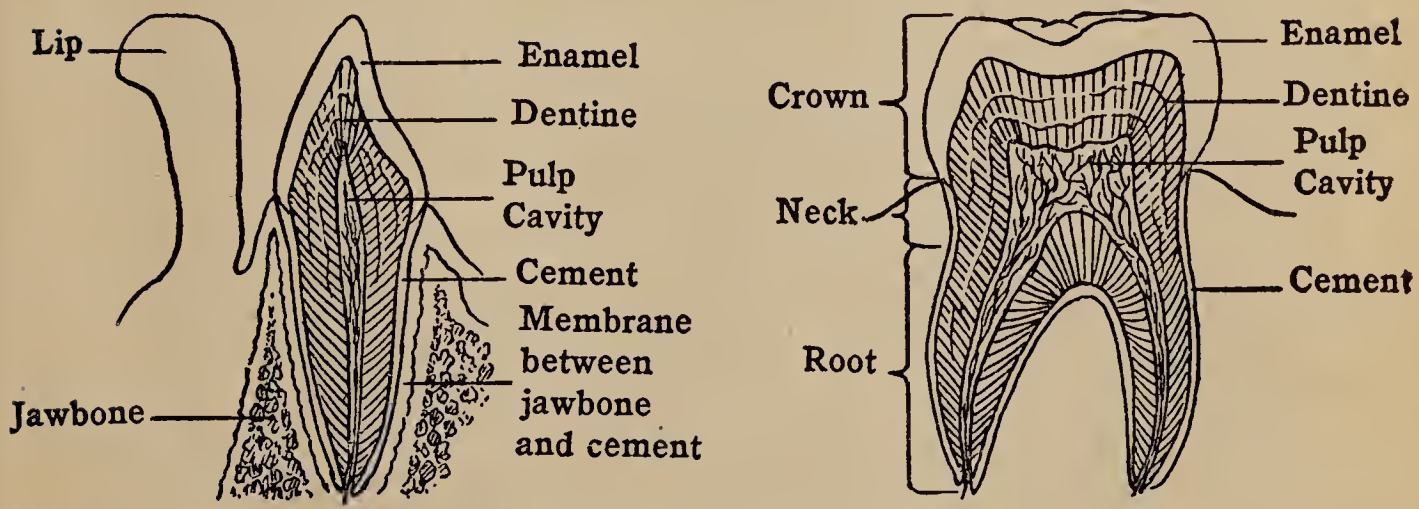
Since the time of John Hunter much has been learned about how to keep the teeth healthy and how to care for diseased teeth. But there is still much that has not been discovered. For example, nobody

knows the exact cause of tooth decay, usually called *dental caries*.

What has been learned is that teeth are healthier if diet is right and if the teeth are given certain hygienic care.

A quart of milk a day and an abundance of fruit and vegetables are needed to furnish the vitamin C and the mineral elements which build strong, healthy teeth. These elements are calcium and phosphorus. Modern experiments seem to show that vitamin D also is important in building and preserving firm tooth tissue. Cod-liver oil, certain other fish oils, irradiated food, and sunshine directly on the skin (not through a window) will provide vitamin D for the body. In summer dairy products are naturally high in vitamin D.

It is advisable to have a semiannual examination by a dentist. Small cavities will then be discovered and filled before they have grown big. Only a dentist can remove substances, tartar for example, which cling to the teeth and harden there.



The parts of a human tooth

By Harold M. Lambert, Phila.

A three-minute brushing twice a day

The gums and teeth should be brushed for at least three minutes twice a day. This will not only help to clean the teeth, but will harden the gums and stimulate circulation. It is said that 98 per cent of the people who use toothbrushes do not brush their teeth for a sufficiently long time.

Food which lodges between the teeth should be removed with a soft toothpick or with dental floss used carefully to avoid bruising the gums.

The teeth and gums should be developed by eating foods which have to be chewed; breadcrusts, raw carrots, apples, and such foods.

The teeth should never be picked with pins or other metal picks, and teeth should never be used to crack nuts, bite thread, or do other work which may crack the enamel.

Beaumont and Digestion

In June of 1822 the little frontier town of Mackinac was crowded with French Canadians and Indians who had brought their winter catch of furs to the trading post of the American Fur Company. Many of the traders were crowded into the company's retail store when someone accidentally discharged a shotgun. Within two feet of the gun was a young French-Canadian, Alexis St. Martin. The whole load of shot was poured into his left side, burning the clothing and tearing a great hole in his body. He fell to the floor as if dead.

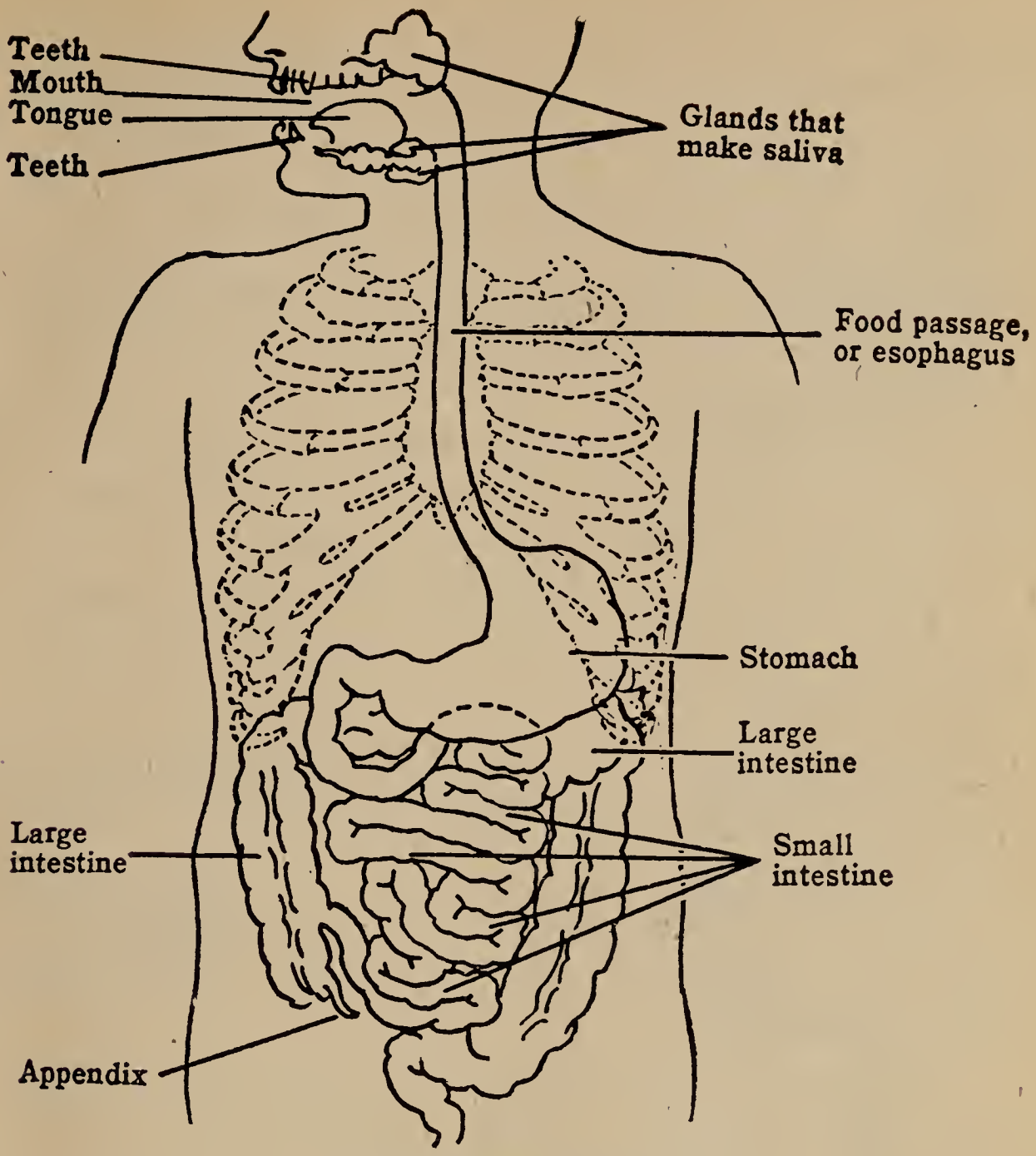
William Beaumont was a young army surgeon stationed at the fort above the town. He immediately answered the call for help, dressed the wound carefully, and remarked as he left, "The man can't live thirty-six hours; I will come to see him by and by."

When Beaumont returned, he was surprised to find Alexis doing much better than had been expected. He dressed the wound every day, and after a while when Alexis' money was gone and no one could be found in the village to care for him, Doctor Beaumont took him into his own family. He provided him with clothes and food and cared for him himself, sometimes dressing his wound twice a day.

Alexis continued to improve and the wound healed except one place where the shot had torn a hole through the wall of his stomach. Try as he would, Doctor Beaumont could not make the wound in the stomach heal. Furthermore all food which Alexis swallowed came pouring out of the hole in his side, unless the Doctor kept a tight adhesive on it. For more than two years the Doctor tried every method known to the medicine of that time as well as everything else he could think of to make the wound heal completely. He was feeling quite hopeless about the case when he suddenly had a brilliant idea.

"This case," he wrote in his notebook, "affords an excellent opportunity for experimenting upon the gastric* fluids and process of digestion. It would give no pain nor cause the least uneasiness to extract a gill of fluid every two or three days, for it frequently flows out spontaneously* in considerable quantities. Various kinds of digestible substances might be introduced into the stomach, and then easily examined during the whole process of digestion. I may, therefore, be able hereafter to give some interesting experiments on these subjects."

At another time he wrote, "When he lies on the opposite side I can look directly into the cavity of the stomach, and almost see the process of digestion. I can pour water in with a funnel, or put in food with a spoon, and draw it out again with a siphon.* I have frequently suspended flesh and other substances into the perforation to ascertain the length of time required to digest each."



The digestive tract

And so it happened that William Beaumont set out to learn the truth about digestion in the stomach and became the first great American physiologist. He observed the length of time needed to digest various kinds of food which he suspended in the stomach by a silk string. He could introduce and withdraw the food when he pleased and note the

changes which took place from time to time. He put a thermometer into the opening and determined the natural temperature of the stomach.

Forming Better Eating Habits

So many of Beaumont's observations are helpful in forming better eating habits that it is worth while noting them here:

"That digestion is made easier by smallness of pieces and tenderness of food, and retarded by opposite qualities. (Chew food thoroughly.)

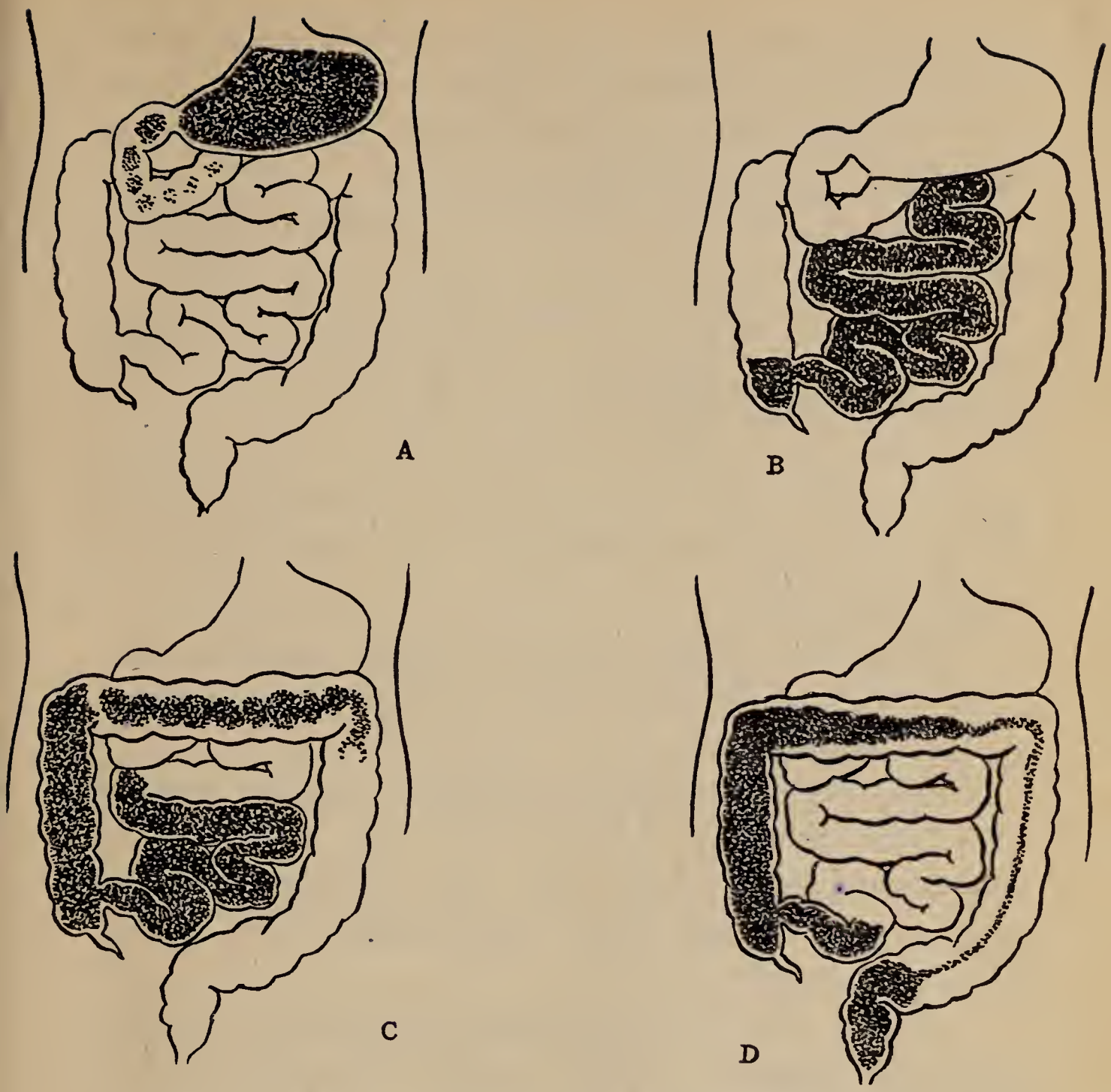
"That the ultimate principles of aliment (nourishment) are always the same, from whatever food they may be obtained.

"That the digestibility of aliment does not depend upon the quantity of nutrient principles (calories) that it contains.

"That bulk as well as nutriment is necessary to the articles of diet. (Eat fruits, vegetables, and whole-grain cereals.)

"That oily food is difficult for digestion, though such food contains a large proportion of nutrient principles. (Do not eat fried foods or too much rich foods.)

"That the time required for the digestion of food is various, depending upon the quantity and quality of the food, state of the stomach, etc., but that the time ordinarily required for the disposal of a moderate meal of the fibrous parts of meat, with bread, etc., is from three to three and one half hours.



Timetable of an ordinary meal. A, B, C, and D show the location of the food at six-hour intervals

"That stimulating condiments* are injurious to the healthy stomach. (Pepper, catsup, spices, pickles, and relishes are some of the stimulating condiments.)

"That the use of ardent spirits always produces disease of the stomach if persevered in. (Whisky,

rum, gin, and other alcoholic drinks were called *ardent spirits* in Beaumont's time.)

"That the agent of chymification (digestion in the stomach) is the gastric juice.

"That it acts as a solvent* of food and alters its properties.

"That its action is helped by the warmth and motions of the stomach. (Large amounts of cold food will retard digestion.)

"That gastric juice is never found free in the gastric cavity, but is always excited to discharge itself by the introduction of food or the introduction of other irritants.

"That, like other chemical agents, gastric juice commences its action on food as soon as it comes in contact with it.

"That it is capable of combining with a certain and fixed quantity of food, and, when more food is presented for its action that it will dissolve, disturbance of the stomach, or "indigestion," will ensue. (Eat moderately.)

"That it becomes initimately* mixed and blended with the ingestae (food) in the stomach by the motions of that organ.

"That gentle exercise facilitates the digestion of food.

"That the inner coat of the stomach is of a pale pink color, varying in its hues according to its full or empty state.

"That in health it is constantly sheathed with a mucous coat (mucous membrane).

"That the gastric juice and mucus are dissimilar in their physical and chemical properties.

"That the motions of the stomach produce a constant churning of its contents, and admixture of food and gastric juice.

"That these motions are in two directions—transverse and longitudinal.

"That the expulsion of the food acted upon by gastric juice is assisted by certain muscles of the stomach."

The Cells

It was about a hundred years ago, and not much more than ten years after Beaumont published the epoch-making results of his work on digestion that two German professors sat together at a dinner party. Their conversation probably ran somewhat like this:

"Yes, indeed," said Professor Schleiden to Professor Schwann, "I have been able to find cells in every leaf, every stem, every petal, and every seed of every plant I have examined."

"In this study of cells," replied Professor Schwann, "you professors of botany have advanced much more than we professors of physiology."

"But didn't you say that you have found cells in the animal tissues you have examined under the microscope?" asked Professor Schleiden.

Schwann nodded. "In certain animal tissues I have found small divisions which are almost exactly like those which you have found in plants."

"Of course they are cells," agreed Schleiden. "Plants are entirely made up of cells, cells grouped in one way to form leaves, cells grouped in another way to form stems. Every piece of plant I put under my microscope is made up of cells, cells, nothing but cells." He grew excited with the newness and greatness of his discovery. Schwann caught the excitement.

"I shall go on with my microscopic study of animal tissues. Perhaps——," Schwann did not finish.

When the party was over, he went home and went to work. On the way home Professor Schwann may have stopped at the butcher shop for some steak, which he, as a physiologist, would have called *muscle tissue.* Or he may have taken the heart and gizzard of a chicken his cook was cleaning. We do not know where he got them, but we do know that he examined every kind of animal tissue he could find. He tore the tissue into bits with his fingers or with needles. He put the pieces on thin rectangles of glass. He examined them through the highest powered lens of his microscope. He shifted his microscope to a better light and he examined some more. And what did he find? He found that every kind of tissue was made up of many smaller parts, as a wall is made up of bricks or as gravel is made up of tiny pebbles. He concluded that these small units of tissue were cells. There were the long, thin cells of muscles, the globe-like cells of fat, and the lacy cells of connective tissue, but most of the cells

he saw were rounded or oval and in each cell was a dark spot. This dark spot is called the *nucleus.*

Hour after hour and day after day he bent over his microscope. Finally he could say with certainty what he had only dared to think the night he talked about cells with Professor Schleiden. He could say that animal tissues, like vegetable tissues, are made up of cells. And after more study he could add another more important truth, all things which contain life develop by forming cells.

How Cells Divide

Since the time of Schleiden and Schwann the study of cells has been going on constantly. And no one can study these minute parts of the body without being filled with wonder. Each cell is a complete living unit. It has to have oxygen and nourishment and it has to get rid of its waste materials or it will die. Cells increase by dividing. One cell can divide to make two cells and each of those to make two more. Even so complex an organism as the human body begins with only one cell. This divides into two cells and each of those into two more and so on until there are a large number of cells.

After a time, as the cells keep dividing, some of them begin to show special characteristics. Certain of them begin to carry oxygen and become red blood cells. Others develop the ability to carry impulses. They become nerves. Still others manufacture and give off juices which other cells need. They become glands. When many cells of the one kind have

finally developed in one place, they form tissue such as bone, muscle, cartilage, fat, glandular, brain, and other kinds of tissue.

Organs

Finally there is developed a group of cells together with blood vessels and nerves which all work together to perform some special activity. Such a group is called an *organ*. The liver is an organ. The stomach is an organ, so are the kidneys and skin. When several organs work together for the same purpose they form a system, such as the digestive system, the nervous system, or the circulatory system.

These systems are completely formed in a baby's body when he is born. But they are small. Therefore, the cells of a baby's body keep on dividing to form more cells like themselves. That is how a baby grows into a child and a child into an adult. When an adult has stopped growing, many of the cells in his body have ceased to divide. The blood cells, however, and certain other body cells keep on dividing.

It is by cell division that cuts are healed and broken bones mended. A person cuts himself and immediately certain cells begin to divide. They keep on until they have formed tissue which holds the cut surfaces together firmly. When their work is done, these cells stop dividing.

Sometimes cells seem to lose their power to stop dividing. They go on piling up tissue where it is not needed. The extra cells which are formed have

no special use in the body. The bunches of useless, disorderly cells which are thus formed are called *tumors,* or sometimes, *cancers.*

The Purpose of Health

Byrd, Lindbergh, Jane Addams, and many other people who have achieved success have recognized the need of health rules for successful living. None of them have, however, lived just to be healthy. Health is a means to an end and should never be an end in itself. People who have no purpose in life but to be healthy and keep healthy are useless citizens. Even for Edward Livingstone Trudeau health was not an end in itself. When he regained his health, he used his strength trying to protect others from the tragic effects of tuberculosis. Men like Gorgas, Byrd, Lindbergh, and women like Jane Addams, Florence Nightingale, and Helen Keller have trained and disciplined their bodies to serve their minds. Such people give to life more than they get, and by them progress is achieved.

★ Tooth Decay—a Problem of the Ages

Without healthy teeth you cannot have a healthy body. Every day over the radio some dentrifice-sponsored program issues sound advice such as, "Brush your teeth twice a day" or "See your dentist at least twice a year." The dental profession has adopted a slogan which, too, it is well to heed: "Conservation of teeth rather than restoration of teeth."

Nature intended that the teeth should be kept clean through natural processes rather than by the artificial means which now seem so necessary. Authorities agree that the foods we now are eating do not keep the teeth clean. Dentists say we have "gone soft" on eating. We should eat foods hard to chew, such as toast or stale bread, celery, lettuce, and apples. All these hard-to-chew foods help to keep the teeth clean. To help build up the teeth we should eat foods rich in lime and phosphorus salts, and vitamins. Milk, orange juice, and foods containing vitamin D are especially good for the teeth.

But modern civilization has not alone fallen heir to dental woes. In the excavations of prehistoric cities, skulls of ancient man reveal the extent of dental disease. The Etruscans, who lived from 800 to 100 B. C., were skilled in dentistry. During that period bridgework, crowns, and other dental restorations were made. Many European museums have exhibits of dental work of the Phoenicians, Greeks, and Romans.

In the Middle Ages when the people had the toothache they invoked the help of a patron saint, Apollonius. After the proper rites were performed, it is said the toothache was always relieved!

Down the ages the practice of dentistry has led to many remarkable new types of restorations and to methods which make operations less painful.

Dental caries, or decay, is the most universal and common disease of mankind. This seems strange, because the use of the toothbrush is an accepted

custom throughout the civilized world. People also are getting more and better dental treatment than ever before.

Tooth decay is believed to be caused largely by the acid formed when the germs in the mouth act on the left-over bits of food lodged between the teeth after eating. This acid dissolves the tooth enamel. Germs thrive on food and moisture—and there always is saliva in the mouth. In this way cavities are formed.

In the battle against tooth decay your toothbrush will be one of your greatest allies. It is interesting to note some of the results of the research work of Professor Appleton of the Dental College of the University of Pennsylvania. He based his conclusions on the study of bacteria in the mouths of several hundred cases. He found that "the greatest number of bacteria were found in the mouth in the morning immediately on arising. After the teeth had been cleaned, the number of bacteria dropped more than 50 per cent; by the noontime meal the bacterial count rose 20 per cent and dropped that much after the brushing, increasing again before dinner up to 75 per cent, after which the count fell about 25 per cent when the teeth were cleaned." Thus it will be seen that by brushing your teeth you can reduce the bacterial content in your mouth from 25 to 50 per cent. In this way you rid yourself of much possibility of tooth decay.

Dental authorities also agree that the best single method of winning the battle against tooth decay is

early dental care. To have good teeth, eat food that will maintain the health of your jaws and teeth; brush your teeth regularly; and make friends with your dentist. Occasional visits to your dentist will do much to nip any malicious decay in the bud.

Things to Do

1. Draw a diagram that will illustrate the principle of blood circulation. Include in this diagram the functions of the work accomplished by the heart, the arteries, the veins, and the capillaries.

2. Make a drawing of a tooth, showing the different substances that compose it.

3. See if you can draw an outline of a set of teeth showing the location of the four classes of teeth in each jaw.

4. On this chart that you have made of a full set of teeth, mark those on which you have had dental work done, those that you have had extracted, and the ones that need dental attention.

5. Make a list of good eating habits that you can follow that will be of benefit to your digestive processes.

★ 6. Ask your teacher if you and one or two of your classmates may go to a dentist's office and talk to him about the teeth and their care. Be ready to give a report to your classmates about your trip to the dentist.

★ 7. Cut out pictures from magazines and newspapers and make a scrapbook about "The Senses."

Do You Know?

Below are some questions. Study these questions and see if you can answer them. If you cannot answer any question, turn to the page number following the question and study that page. Then turn back to this page and see if you can answer all the questions.

1. How can blind people learn to read? (page 291)

2. Why is it dangerous to put anything in your ear? (page 282)

3. What does the eardrum do when sound waves hit it? (page 283)

4. What causes earaches and running ears? (pages 285, 286)

5. What is meningitis? (page 286)

6. What is now done in many States to prevent new-born children from becoming blind? (page 292)

7. How can you avoid eyestrain? (page 296)

8. How is blood circulated throughout your body? (pages 308, 309)

9. What does your heart do? (page 305)

10. What does the blood carry to the different parts of the body? (page 308)

11. What does the blood carry away from the different parts of the body? (page 308)

12. What are some good eating habits that will enable your stomach to digest food? (page 320)

13. What are the harmful effects of alcoholic drinks? (page 321)

14. What do the gastric juices in your stomach do? (page 322)

15. What are the effects of moderate exercise on digestion? (page 322)

16. What is the dark spot found in each and every cell called? (page 325)

17. Do all your cells do the same work? (page 325)

18. Name some special work that different cells do? (page 325)

19. Do you know of what substances your teeth are composed? (page 312)

What Do You Do?

Just to know what to do will not make you strong and healthy. To be strong and healthy you must do the things you know you should do. Here are some questions about what you do:

1. Do you help your parents or friends of your parents take care of younger children?

2. Do you eat too much candy and sweets?

3. Do you eat many highly seasoned foods?

4. Do you receive the proper amount of sleep for your age?

5. Do you ever rest or nap after lunch?

6. Do you wash your ears correctly?

7. Do you have your eyes tested regularly?

8. What do you do to safeguard your eyes against communicable diseases of the eye?

9. How do you remove foreign matter from your eyes?

10. How do you fix the light when you read at night?

11. Do you follow good habits when you read?

12. Do you have any tooth cavities that need attention?

13. Do you eat foods that will help to keep your teeth healthy?

14. Do you have a toothbrush?

15. Do you ever use your teeth to crack nuts or to bite objects that might crack the enamel on your teeth?

16. Do you chew your food thoroughly?

17. Are you in the habit of eating your food too rapidly?

APPENDIX: WEIGHT IN RELATION TO AGE, HEIGHT, AND PHYSICAL TYPE

(Based Upon the Tables of Bird T. Baldwin, Ph.D.)

INSTRUCTIONS FOR USE OF CHART

1. Before the pupil is measured, it should be determined by careful observation to which physical type he belongs. In case of doubt it may be helpful to note that the Nordic races (central and northwestern Europe) are usually of the tall, slender type; the southern European or Mediterranean races are usually of the short, stocky type.

2. The pupil's height in inches should be taken against the scale of the type to which he belongs. When measuring a pupil a right-angled triangle or square placed against the wall and on top of the pupil's head should be used to secure accuracy. To facilitate measurement a scale graduated in inches, half inches and, quarter inches may be accurately marked on a wall or stick, beginning 74 inches from the floor and running downward as far as the class minimum requires.

3. The following illustrations will serve to interpret the scale:

A 14-year-old boy of the tall, slender type, 67 inches tall. He is of normal weight if he weighs 128 pounds; he would be considered underweight if he weighed under 115 pounds; and overweight if he weighed over 153 pounds.

A 15-year-old girl of the average type, 63 inches tall. She is of normal weight if she weighs 116 pounds; she would be considered underweight if she weighed under 104 pounds; and overweight if she weighed over 139 pounds.

TALL, SLENDER TYPE									AVERAGE TYPE									SHORT, STOCKY TYPE								
BOYS					GIRLS				BOYS					GIRLS				BOYS					GIRLS			
Weight (Lbs.)						Weight (Lbs.)			Weight (Lbs.)						Weight (Lbs.)			Weight (Lbs.)						Weight (Lbs.)		
Underweight	Overweight	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Overweight	Underweight	Underweight	Overweight	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Overweight	Underweight	Underweight	Overweight	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Overweight	Underweight
Under	Over						Over	Under	Under	Over						Over	Under	Under	Over						Over	Under
154	205	171	19	74									74									74				
153	204	170	18																							
151	201	168	17																							
148	197	164	16																							
150	200	167	19	73									73									73				
148	197	164	18																							
146	194	162	17																							
144	192	160	16																							
147	195	163	19	72									72									72				
142	189	158	18																							
140	187	156	17																							
140	187	155	16																							
138	183	153	15																							
137	182	152	17	71					143	191	159	19	71									71				
136	181	151	16						139	185	154	18														
135	180	150	15																							
133	177	148	17	70					140	187	155	19	70									70				
130	174	145	16						135	180	150	18														
130	173	144	15																							
129	172	143	14																							

APPENDIX: WEIGHT IN RELATION TO AGE, HEIGHT, AND TYPE (*Cont.*)

TALL, SLENDER TYPE

BOYS

Weight (Lbs.)			Age (Years)	Height (Inches)
Underweight	Overweight	Normal Weight		
Under	Over			
125	167	139	15	69
125	167	139	14	
121	161	134	15	68
121	161	134	14	
115	153	128	14	67
110	146	122	14	66
107	143	119	13	
107	143	119	12	
105	140	117	13	65
100	133	111	13	64
98	131	109	12	
96	128	107	13	63
95	127	106	12	
91	121	101	12	62
86	115	96	13	61
85	114	95	11	

GIRLS

Age (Years)	Weight (Lbs.)			Height (Inches)
	Normal Weight	Overweight	Underweight	
	Under	Over	Under	
18	142	170	128	69
17	140	168	126	
16	138	166	124	
18	138	166	124	68
17	138	166	124	
16	136	163	122	
15	135	162	121	
14	133	160	120	
18	135	162	121	67
17	133	160	120	
16	133	160	120	
15	131	157	118	
14	130	156	117	
18	130	156	117	66
17	129	155	116	
16	128	153	115	
15	125	150	112	
14	124	149	112	
13	124	149	112	
15	122	146	110	65
14	121	145	109	
13	120	144	108	
13	115	138	103	64
12	114	137	103	
13	110	132	99	63
12	110	132	99	
12	105	126	94	62
12	100	120	90	61
11	99	119	89	

AVERAGE TYPE

BOYS

Weight (Lbs.)			Age (Years)	Height (Inches)
Underweight	Overweight	Normal Weight		
Under	Over			
137	182	152	19	69
134	179	149	18	
131	175	146	17	
129	172	143	16	
132	176	147	19	68
129	172	143	18	
127	169	141	17	
123	164	137	16	
122	163	136	17	67
121	161	134	16	
117	156	130	15	
119	158	132	17	66
115	153	128	16	
112	150	125	15	
110	146	122	16	65
108	144	120	15	
106	142	118	14	
103	138	115	15	64
102	136	113	14	
99	132	110	15	63
97	130	108	14	
93	123	103	14	62
92	122	102	13	
89	119	99	14	61
87	116	97	13	

GIRLS

Age (Years)	Weight (Lbs.)			Height (Inches)
	Normal Weight	Overweight	Underweight	
	Under	Over	Under	
18	126	151	113	65
17	125	150	112	
16	123	148	111	
18	123	148	111	64
17	122	146	110	
16	120	144	103	
15	119	143	107	
14	117	140	105	
18	120	144	108	63
17	119	143	107	
16	117	140	105	
15	116	139	104	
14	112	134	101	
15	113	136	102	62
14	109	131	98	
13	106	127	95	
14	105	126	94	61
13	101	121	91	

SHORT, STOCKY TYPE

BOYS

Weight (Lbs.)			Age (Years)	Height (Inches)
Underweight	Overweight	Normal Weight		
Under	Over			
128	170	142	19	67
125	167	139	18	
125	167	139	19	66
122	163	136	18	
121	161	134	19	65
118	157	131	18	
115	152	127	17	
117	156	130	19	64
113	151	126	18	
109	145	121	17	
105	140	117	16	
115	152	127	19	63
111	148	123	18	
106	142	118	17	
102	136	113	16	
100	133	111	17	62
96	128	107	16	
94	125	104	15	
93	123	103	16	61
90	120	100	15	

GIRLS

Age (Years)	Weight (Lbs.)			Height (Inches)
	Normal Weight	Overweight	Underweight	
	Under	Over	Under	
18	118	142	106	62
17	117	140	105	
16	115	138	103	
18	116	139	104	61
17	113	136	102	
16	112	134	101	
15	108	130	97	

APPENDIX: WEIGHT IN RELATION TO AGE, HEIGHT, AND TYPE (*Cont.*)

TALL, SLENDER TYPE										AVERAGE TYPE										SHORT, STOCKY TYPE									
BOYS					GIRLS					BOYS					GIRLS					BOYS					GIRLS				
Weight (Lbs.)						Weight (Lbs.)				Weight (Lbs.)						Weight (Lbs.)				Weight (Lbs.)						Weight (Lbs.)			
Underweight	Overweight	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Overweight	Underweight		Underweight	Overweight	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Overweight	Underweight		Underweight	Overweight	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Overweight	Underweight	
Under	Over						Over	Under		Under	Over						Over	Under		Under	Over						Over	Under	
83	110	92	12	60	12	95	114	85												86	115	96	16	60	18	111	133	100	
83	110	92	11		11	95	114	85		84	112	93	13		13	97	116	87		85	114	95	15		17	109	131	98	
																				85	113	94	14		16	108	130	97	
																									15	105	126	94	
																									14	101	121	91	
79	106	88	11	59	11	90	108	81		80	107	89	13	59	13	92	110	83		81	108	90	15	59	16	103	123	93	
78	104	87	10		10	87	104	78		80	107	89	12		12	90	108	81		81	108	90	14		15	100	120	90	
																									14	96	115	86	
76	101	84	11	58	11	86	103	77						58						78	103	87	15	58	15	96	115	86	
76	101	84	10		10	84	101	76		76	102	85	12		12	86	103	77		77	103	86	14		14	93	112	84	
																				76	102	85	13		13	88	106	79	
72	96	80	10	57	10	82	98	74		73	97	81	12	57	12	82	98	74		75	100	83	14	57	14	88	106	79	
										73	97	81	11		11	82	98	74		74	98	82	13		13	84	101	76	
69	92	77	10	56	10	78	94	70		69	92	77	12	56	12	79	95	71		70	94	78	14	56	14	83	100	75	
68	91	76	9		9	76	91	68		69	92	77	11		11	78	94	70		70	94	78	13		13	81	97	73	
65	86	72	9	55	9	74	89	67		66	88	73	11	55	11	74	89	67		67	89	74	13	55	13	77	92	69	
					8	72	86	65		66	88	73	10		10	74	89	67		67	89	74	12		12	75	90	67	
63	84	70	9	54	9	70	84	63							11	71	85	64		64	85	71	13	54	13	73	88	66	
63	84	70	8		8	69	83	62		63	84	70	10	54	10	70	84	63		64	85	71	12		12	71	85	64	
																				63	84	70	11						
60	80	67	8	53	8	67	80	60		60	80	67	10	53	10	68	82	61		61	82	68	12	53	12	69	83	62	
										60	80	67	9		9	67	80	60		60	80	67	11		11	68	82	61	
58	77	64	8	52	8	64	77	58		58	77	64	9	52	10	64	77	58		58	77	64	11	52	12	67	80	60	
57	76	63	7		7	63	76	57							9	64	77	58		58	77	64	10		11	65	78	58	
										55	73	61	9							55	73	61	11		12	65	78	58	
55	73	61	7	51	7	59	71	53		55	73	61	8	51	9	61	73	55		55	73	61	10	51	11	63	76	57	
															8	60	72	54							10	61	73	55	
52	70	58	7	50	7	56	67	50												52	70	58	10	50	11	61	73	55	
51	68	57	6		6	56	67	50		52	70	58	8	50	8	57	68	51		52	70	58	9		10	59	71	53	
																									9	58	70	52	
49	66	55	6	49	7	54	65	49		49	66	55	8	49	8	55	66	49		49	66	55	10	49	10	56	67	50	
					6	54	65	49		49	66	55	7							49	66	55	9		9	55	66	49	
																				48	64	53	9		10	53	64	48	
47	62	52	6	48	6	52	62	47		48	64	53	7	48	7	52	62	47		48	64	53	8	48	9	52	62	47	
																									8	52	62	47	
44	59	49	5	47	6	50	60	45		45	60	50	7	47	7	50	60	45		45	60	50	9	47	9	50	60	45	
					5	49	59	44		45	60	50	6							45	60	50	8		8	50	60	45	

APPENDIX: WEIGHT IN RELATION TO AGE, HEIGHT, AND TYPE (*Cont.*)

TALL, SLENDER TYPE									AVERAGE TYPE									SHORT, STOCKY TYPE								
BOYS					GIRLS				BOYS					GIRLS				BOYS					GIRLS			
Weight (Lbs.)						Weight (Lbs.)			Weight (Lbs.)						Weight (Lbs.)			Weight (Lbs.)						Weight (Lbs.)		
Under	Over	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Over	Under	Under	Over	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Over	Under	Under	Over	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Over	Under
42	56	47	5	46	5	47	56	42	43	58	48	6	46	7	47	56	42	43	58	48	8	46	9	48	58	43
														6	47	56	42	43	58	48	7		8	48	58	43
				45	5	45	54	40	41	55	46	6	45	6	45	54	40	41	55	46	8	45	8	45	54	40
									41	55	46	5						41	55	46	7		7	45	54	40
				44	5	42	50	38	40	52	44	5	44	6	42	50	38	40	53	44	7	44	7	42	50	38
																		40	53	44	6					
				43									43	5	41	49	37	37	49	41	7	43	7	41	49	37
																		37	49	41	6		6	41	49	37
																		37	49	41	5					
				42									42	5	39	47	35	35	47	39	6	42	7	39	47	35
																							6	39	47	35
				41									41					34	45	38	6	41	6	37	44	33
																		34	45	38	5		5	37	44	33
				40									40									40	5	36	43	32

(Courtesy Division of Physical and Health Education, The Board of Public Education, Philadelphia, Pa.)

Glossary

Explanation: The word in black type tells how to write or spell a word. The word within parentheses like this, (ăb-dō′mĕn), tells you how to say it. Then you are told what the word means.

When you sound out the word, the little marks like this, -, tell you how to divide the letters into groups. You say the group before this mark, ′, a little more strongly than the other letters. The mark, ″, means the group is pronounced strongly but not as strongly as when ′ is used.

These words will show you how to say the letters that are marked:

āte, aȯrta, căt, fär, ållow, râre, sofȧ, àsk; ēat, lĕt, ẽvent, novĕl, mothēr; bīte, pĭn; nō, tŏp, dôg, ôr, ȯbey, cŏmpare; ūnit, cŭt, focŭs, ûnite, bûrn; no͞on, fo͝ot; mound; coin

A

abdomen (ăb-dō′mĕn). The large cavity of the body which contains the organs of digestion.

accessible (ăk-sĕs′ĭ-bl). Easy to reach.

acid (ăs′ĭd). A sour substance. Some acids are burning.

acquire (ă-kwīr′). Obtain; get.

adenoids (ăd′ē-noidz). A spongy growth in the back of the nose.

affected (ă-fĕk′tĕd). Attacked or influenced, as by a disease, injury, or condition.

alkali (ăl′kȧ-lī). A substance which neutralizes an acid. Some alkalis are burning or corrosive.

analyze (ăn′ȧ-līz). To examine carefully; as to *analyze* water to detect germs.

anesthesia (ăn″ĕs-thē′zhĭ-ȧ). A state of insensibility to pain or other sensation. **General anesthesia:** A condition in which the patient is in a sleep-like state and unconscious of what is happening: **Local anesthesia:** A condition in which a part of the body is insensible to pain or other sensation.

anesthetic (ăn″ĕs-thĕt′ĭk). Something used to cause insensibility to pain.

animated (ăn′ĭ-māt-ĕd). Full of life; lively.

anthrax (ăn′thrăks). A kind of contagious disease of animals and man.

antiscorbutic (ăn″tĭ-skŏr-bū′tĭk). Preventing scurvy. Anything that prevents scurvy.

antiseptic (ăn″tĭ-sĕp′tĭk). Preventing the growth of disease germs. Anything that prevents the growth of disease germs.

appalling (ă-pôl′ĭng). Shocking; frightful.

appendix (ă-pĕn′dĭks). A small baglike outgrowth of the intestine.

arch (ärch). **Dental arch:** The curve of the teeth in the jaw.

archeological (är″kē-ŏ-lŏj′ĭ-kăl). Relating to a study of the past, especially to a study of the daily life of early peoples.

B

bacillus (bȧ-sĭl′ŭs). A kind of bacterium.

bacteria (băk-tē′rĭ-ȧ). A group of one-celled vegetable organisms, so small that they can be seen only with a microscope, which live upon living and dead animal or plant tissues. Some cause disease and some have useful functions.

barren (băr′ĕn). Unproductive.

bedfast (bĕd′fȧst). Not able to leave one's bed.

C

carbon dioxide (kär′bŏn dī-ŏk′sīd). A colorless gas, a waste product of the body exhaled in the breath.

casual (kăzh′ū-ăl). Indifferent; marked by lack of interest.

cathartic (kȧ-thär′tĭk). A drug causing bowel movements.

cell (sĕl). One of the microscopic units of which every living thing is composed.

chlorinated (klō′rĭ-nāt-ĕd). Containing or treated with a purefying gas called *chlorine*.

cholera (kŏl′ĕr-ȧ). A highly contagious, usually fatal disease.

cilia (sĭl′ĭ-ȧ). The tiny—often microscopic—hairlike projections on the linings of certain organs. The constant sweeping movements of the cilia tend to direct the motion of matter passing over them.

coagulate (kŏ-ăg′ū-lāt). To clot; to thicken; to curdle.

communicable (kŏ-mū′nĭ-kȧ-bl). Capable of being transferred from one to another, as disease; catching.

compatible (kŏm-păt′ĭ-bl). Agreeable; suitable.

competent (kŏm′pē-tĕnt). Possessed of suitable ability or qualifications.
complicated (kŏm′plĭ-kāt-ĕd). Intricate; confusing; having many varied aspects.
compress (kŏm′prĕs). A soft pad.
concave (kŏn′kāv). Curved like the inside of a ball.
condiment (kŏn′dĭ-mĕnt). A spice or spicy relish; seasoning.
congenial (kŏn-jēn′yăl). Agreeable; easy to get along with; offering pleasant companionship.
congested (kŏn-jĕst′ĭd). Crowded; too full.
conscience (kŏn′shĕns). The ability to tell right from wrong.
constrained (kŏn-strānd′). Cramped.
contaminate (kŏn-tăm′ĭ-nāt). Infect; pollute; soil; make unwholesome.
convex (kŏn-vĕks′). Curved like the outside of a ball.
corrosive (kŏ-rō′sĭv). Destroying; eating away, as a *corrosive* acid. A substance which destroys or injures in this way.
court (kôrt). A reception held by a king or queen.
criterion (krī-tē′rĭ-ŭn). Test; measure; standard on which a judgment may be formed.
critical (krĭt′ĭ-kăl). Risky; at a point requiring action.

D

dawdle (dô′dl). Waste time.
deciduous (dē-sĭd′ū-ŭs). Of teeth, the first, or baby, teeth, which are replaced by the permanent teeth.
dehydrated (dē-hī′drāt-ĭd). Freed of water.
deodorant (dē-ō′dēr-ănt). Something that destroys odors.
diet (dī′ĕt). Food considered in its relationship to health or nourishment; a prescribed course in feeding.
disinfectant (dĭs″ĭn-fĕk′tănt). Anything that will destroy germs of disease.
distract (dĭs-trăkt′). Turn aside, as the attention.
duct (dŭkt). A tube in the body through which liquids or other materials pass, as tear ducts, sweat ducts, etc.
dysentery (dĭs′ĕn-tĕr-ĭ). A disease of the intestines.

E

efficiency (ĕ-fĭsh′ĕn-sĭ). Ability to produce a desired result, or to produce the best result with the least effort; capability.
emergency (ĕ-mûr′jĕn-sĭ). A sudden or unexpected happening demanding prompt action.

encounter (ĕn-koun′tẽr). Meet.
enhance (ĕn-hȧns′). To increase.
epidemic (ĕp″ĭ-dĕm′ĭk). A widespread occurrence, as of disease; as, an *epidemic* of measles. Also, widespread; as, an *epidemic* disease.
equerry (ĕk′wẽr-ī). An attendant upon a royal or noble person.
essential (ĕ-sĕn′shăl). A necessary thing.
evacuate (ē-văk′ū-āt). Vacate; withdraw from.
evoke (ē-vōk′). To call forth.
excretion (ĕks-krē′shŭn). Waste matter thrown off by the body.
exhale (ĕks-hāl′). To breath out.
experimentation (ĕks-pĕr″ĭ-mĕn-tā′shŭn). The act or process of finding out or proving by trial or test.
exploring (ĕks-plôr′ĭng). Examining; discovering.
exquisitely (ĕks′kwĭ-zĭt-lĭ). Extremely; to the highest degree.
eye (ī). The organ of sight. Also, of a ship, the foremost part.

F

fallacy (făl′ȧ-sĭ). A mistaken idea.
fatal (fā′tăl). Causing death.
fermentation (fûr″mĕn-tā′shŭn). A change produced by the action of certain bacteria, as yeast in dough or fruit juices.
flexible (flĕk′sĭ-bl). Easily bent.
focus (fō′kŭs). The point from which an infection spreads.

G

gastric (găs′trĭk). Pertaining to the stomach.
generator (jĕn′ẽr-ā″tẽr). Something which produces, especially a device for producing an electric current.
germ (jûrm). A bacterium, especially one causing disease.
germicidal (jûr′mĭ-sīd″ăl). Destructive of germs; disinfectant.
goiter (goi′tẽr). A disease of a certain gland in the neck, often causing a large swelling on the front of the neck.

H

handicap (hăn′dĭ-căp). Hindrance; disadvantage.
hazardous (hăz′ẽr-dŭs). Dangerous; risky.
heritage (hĕr′ĭ-tĭj). Inheritance.
hospitality (hŏs′pĭ-tăl′ĭ-tĭ). Entertainment, as of a guest.
hydrophobia (hī″drŏ-fō′bĭ-ȧ). Rabies; a disease of animals and sometimes man. Usually caused by the bite of an infected animal.
hygiene (hī′jēn). The branch of medicine dealing with health.

I

immaculate (ĭ-măk′ū-lĭt). Spotless; absolutely clean.
immune (ĭ-mūn′). Unable to contract a contagious disease.
immunity (ĭ-mū′nĭ-tĭ). Inability to do or have something.
impulsive (ĭm-pŭl′sĭv). Apt to be moved to action by sudden or momentary feeling or emotion.
inadequate (ĭn-ăd′ĕ-kwĭt). Not sufficient.
inevitable (ĭn-ĕv′ĭ-tȧ-bl). Not to be avoided.
infection (ĭn-fĕk′shŭn). Communication of disease germs.
infirmary (ĭn-fûr′mȧ-rĭ). A hospital.
inflammable (ĭn-flăm′ȧ-bl). Easily set afire.
initiative (ĭ-nĭsh′ĭ-ȧ-tĭv). Willingness to try a new undertaking, attempt a new method, assume responsibility without being ordered to do so.
insignia (ĭn-sĭg′nĭ-ȧ). Badge; distinguishing mark.
intimately (ĭn′tĭ-māt-lĭ). Closely; thoroughly.
isolation (ī″sŏ-lā′shŭn). A condition of complete separation.

L

larva (lär′vȧ). The intermediate form (often wormlike) of an insect between the egg and the full grown state. As wigglers are the *larvae* of mosquitoes.
laxative (lăk′sȧ-tĭv). A medicine causing bowel movements.
legitimate (lĕ-jĭt′ĭ-mĭt). Reasonable; logical.
ligament (lĭg′ȧ-mĕnt). A strong band holding the ends of bones or bodily organs in place.
lime-wash (līm′-wŏsh′). Whitewash—a British term.

M

mastication (măs″tĭ-kā′shŭn). The act or process of chewing.
medicated (mĕd′ĭ-kāt″ĕd). Treated or saturated with medicine.
meningitis (mĕn″ĭn-jī′tĭs). Inflammation of the membranes covering the brain and spinal cord.
mental (mĕn′tăl). Pertaining to the mind.
mercurochrome (mĕr-kū′rō-krōm). A kind of mild disinfectant.
mercury (mûr′kū-rĭ). A poisonous liquid metal, used in various preparations as a germicide.
miasma (mī-ăz′mȧ). A poisonous vapor arising from swamps, formerly thought the cause of malaria.
molar (mō′lĕr). One of the grinding, or double, teeth.
mucous membrane (mū′kŭs mĕm′brān). The skin lining the mouth, nose, and certain other parts of the body.

O

obstructing (ŏb-strŭkt′ĭng). Hindering; blocking; impeding.
oculist (ŏk′ū-lĭst). A physician skilled in treatment of the eyes.
opportunity (ŏp″ŏr-tū′nĭ-tĭ). Chance.
oxygen (ŏk′sĭ-jĕn). A gas in the atmosphere, necessary to life.

P

paralysis (pȧ-răl′ĭ-sĭs). Lack of feeling or lack of power to move a part of the body, or both; **infantile paralysis,** a contagious disease affecting the spine and often causing partial paralysis or death. When children are attacked, growth of the paralyzed part is checked, often resulting in a withered limb.
paratyphoid (păr-ȧ-tī′foid). A disease resembling typhoid fever.
parka (pär′kȧ). A loose, shirtlike, hooded outer garment.
pedestrian (pĕ-dĕs′trĭ-ăn). One who travels on foot.
penguin (pĕn′gwĭn). A sea bird of Antarctic regions, with wings useless for flight but used as paddles in swimming. **Emperor penguin,** a large variety of this bird.
persistently (pẽr-sĭs′tĕnt-lĭ). With continued effort; without slackening; determinedly.
physical (fĭz′ĭ-kăl). Relating or pertaining to the body.
plebe (plēb). A student in the lowest class at the United States Naval Academy, corresponding to a freshman at college.
pneumonia (nū-mō′nĭ-ȧ). A germ-caused disease of the lungs, usually severe and of short duration.
pollute (pŏ-lūt′). To make unclean or insanitary.
posture (pŏs′tūr). The way one holds one's body.
precaution (prē-kô′shŭn). Care taken beforehand.
premature (prē″mȧ-tūr′). Early; before its time; as, *premature* old age.
preserved (prē-zûrvd′). Unspoiled by time, climate, bacteria, or other destructive forces.
prevalent (prĕv′ȧ-lĕnt). Widespread; common; as colds are *prevalent* in damp weather.
provisioned (prŏ-vĭzh′ŭnd). Supplied with food.
pupa (pū′pȧ). The stage in the life of an insect when it is in its cocoon.
putrefying (pū′trē-fī-ĭng). Decaying; rotting.

Q

quirk (kwûrk). Peculiarity; oddity; eccentricity.

R

rabies (rā′bĭ-ēz). Hydrophobia. An infectious and always fatal disease of animals and man, usually contracted from the bite of an infected animal.

reconcile (rĕk′ŏn-sīl). To adjust; to become used to.

regime (rā-zhēm′). System of living.

reluctance (rē-lŭk′tăns). Unwillingness; hesitation.

retina (rĕt′ĭ-nȧ). The sensitive coating of the back of the eyeball, containing the nerves of sight.

rigorous (rĭg′ẽr-ŭs). Stern; severe; strict.

roughage (rŭf′ĭj). Bulky food, as leafy vegetables, bran, etc.

S

salami (sä-lä′mē). A kind of sausage.

salt horse (sôlt hôrs). In sailor slang, salted beef.

sanitary (săn′ĭ-tĕr″ĭ). Relating to health; healthful.

schedule (skĕd′ūl). A list of things to be done in a certain order or time.

scientific (sī″ĕn-tĭf′ĭk). In accord with the findings of scholarly and unprejudiced study and experimentation.

scrupulous (skro͞o′pū-lŭs). Conscientious; very thorough.

scurvy (skûr′vĭ). A disease caused by the lack of certain food elements contained in fresh vegetables.

siphon (sī′fŏn). A bent tube through which liquids may be lifted over an elevation by suction caused by the weight of the liquid in the discharging arm of the tube.

solvent (sŏl′vĕnt). A liquid capable of dissolving a substance. Water is a solvent for sugar; gasoline for rubber, etc.

spectacular (spĕk-tăk′ū-lẽr). Showy; making a great display.

spontaneously (spŏn-tā′nē-ŭs-lĭ). Of its own accord.

spore (spôr). A cell which may develop into a new plant or animal.

squalid (skwŏl′ĭd). Very dirty; filthy.

stability (stȧ-bĭl′ĭ-tĭ). Firmness of character or purpose.

stalwart (stôl′wẽrt). Sturdy; strong; muscular.

statistics (stȧ-tĭs′tĭks). Facts or figures relating to a given subject.

sterile (stĕr′ĭl). Free of living germs.

stimulant (stĭm′ū-lănt). That which spurs on. Often a liquor.

strategy (străt′ē-jĭ). Plan of attack or management.

subordinated (sŭ-bôr′dĭ-nāt-ĕd). Made dependent upon or secondary to.

swell (swĕl). A long, continuous wave on water.

T

terminate (tûr′mĭ-nāt). To end; to come to an end.
tetanus (tĕt′*ȧ*-nŭs). Lockjaw; a germ disease causing muscular spasms, and sometimes inability to move the jaw. Usually fatal unless promptly treated.
thyroid (thī′roid). A gland in the neck. A diseased condition of this gland is known as *goiter*.
tourniquet (to͝or′nĭ-kĕt). A tight bandage to prevent bleeding by pressure upon the cut blood vessel.
trachoma (tr*ȧ*-kō′m*ȧ*). A contagious disease of the eyelids.
trait (trāt). A characteristic.
treacherous (trĕch′ĕr-ŭs). Not to be trusted or depended upon.
tuberculosis (tū-bûr″kū-lō′sĭs). A contagious disease caused by a germ known as the *tubercle bacillus*.

U

unaccountable (ŭn″ă-koun′t*ȧ*-bl). Impossible to explain.
uncanny (ŭn-kăn′ĭ). Outside human experience or understanding.
urine (ū′rĭn). Waste water of the body, stored in the bladder before discharge from the body.

V

varicose (văr′ĭ-kōs). Of veins, swollen with blood, due to imperfect circulation.
vermin (vûr′mĭn). Harmful small animals and insects, as mice, fleas, etc.
virus (vī′rŭs). The poison produced by an infectious disease, by means of which the disease may be communicated.
vision (vĭzh′ŭn). The sense of sight.
visualized (vĭzh′ū-ăl-īzd). Seen beforehand in the mind's eye.
vitamin (vī′t*ȧ*-mĭn). Any of certain elements in foods beneficial to or necessary for health or growth.
vivacious (vī-vā′shŭs). Lively; full of life.
vivid (vĭv′ĭd). Clear; realistic.
vocational (vŏ-kā′shun-ăl). Pertaining to an occupation.
vogue (vōg). Fashion; a prevalent mode.

W

wholesome (hōl′sŭm). Clean; healthful.

Z

zwieback (zwē′bäk″). A kind of hard toast.

Index

A

Abdomen, 32
Accidental deaths, causes of (table), 70
Accidents, and drunken driving, 65; fatal, 63, 66–69, 102; how to avoid, 15, 62, 69, 73, 76–82; keeping record of, 80; to school children (table), 72
Addams, Jane, 140–145; attitude toward children, 149, 152, 154–156, 161; and civic improvements, 166–167, 171–172; establishes Hull House, 145, 148, 155; and sweatshop system, 151–153, 157
Adirondacks, 255, 256, 259, 261
Air, 248; and germs, 227, 244; purity of, 8, 117, 122, 141, 262
Alcoholic drinks, 65–66; effects of, 168–171, 322
Alveolar process, 312
American Dental Association, 133
American Medical Association, 133
Anaesthesia, 18, 102
Antarctica, 8, 16, 23, 29
Antiseptic, 93
Antitoxins, 212, 220
Appendicitis, 18
Arteries, 304–305
Athletics, 31
Automobile accidents, 65–68, 92

B

Baby, 226
Bacteria, 24, 133, 203, 220–225, 231, 233, 250
Bathing, 127, 129, 131, 233
Bathysphere, 240–243
Bear, The, 6, 10, 15
Beaumont, William, 317–323
Beebe, William, 240–243
Bell, Alexander Graham, 274
Bicycle, 66, 75, 88
Bleeding, how to stop, 92
Blindness, 271–282, 284, 291, 293
Blood, 11, 22, 32, 92; circulation of, 132, 302–309; vessel, 93, 304–306
Board of Health, 48, 171–173, 204
Boils, 234
Bone, 37, 47, 312
Boy Scout, 4
Braille, 291–292
Brain, 32
Breakfast, 23, 44, food elements in, 53
Breathing, 242–248, 250
Butter, 8
Bruises, 91
Burns, 69
Byrd, Richard E., 1–4, 6–11, 15–20, 26–31, 37, 44, 49, 56

C

Calories, amount required to make 100, 50
Camp, clothing for, 25; at Little America, 6, 15, 23, 28; putting out fires in, 87; Retreat, 18
Capillaries, 304–305
Carbohydrates, 46, 49
Cathartics, 126
Catholic sisters, 110
Cells, 35, 49, 220; division of, 326; red blood, 47, 302–305, 325; study of, 323–325
Character, 9, 25, 30
Child labor, 152–154
Chloroform, 103
Cholera, 111
Christmas Seals, 263–266
Circulation, 22, 303–309
Cleanliness, 120; of food, 201; of house, 121–123, 144–148, 164;

of milk, 162; personal, 126–132, 161; of streets, 155, 166, 183
Climate, 44
Clothing, for camp, 25; cleanliness of, 161; fur, 4; heavy, 16, 20; ill-fitting, 37; made in sweatshop, 152
Cocaine, 167–168
Cold, extreme, 8, 20, 21, 23, 24, 44
Colds, common, 11, 228, 245, 262, 282
Community, health, 140; kitchen, 157; playgrounds, 154–156
Conservation of food, 20; clothing, 20; shelter, 20
Constipation, 126
Crevasse, 16
Crimean War, 110
Cuts, treatment of, 92

D

Danger, how to avoid, 16, 75–85
Deafness, 281–282, 285, 288
Diaphragm, 247
Diet, essentials, 46–48, 328; and Florence Nightingale, 126; protective, 52–54; well-balanced, 3, 44, 49, 51–52; wrong, 25
Digestive system, 11, 32, 231; diagram of, 319; muscles of, 33; study of, by Beaumont, 318–323
Discovery II, 10
Diseases, cholera, 111; common, 136; contagious, 12, 24, 58, 120, 209, 227, 232; diphtheria, 5, 12, 196, 198; dysentery, 111, 183; of eye, 294; fever, 111; malaria, 175, 190; prevention of, 11, 184, 187, 190, 196, 224–225, 230, 281; rheumatism, 6; scurvy, 3, 44; smallpox, 5, 12, 198, 211; typhoid, 5, 12; 164, 183, 196, tuberculosis, 5, 37; typhoid, 5, 12, 164, 183, 196; yellow fever, 174, 181–190
Disinfectant, 229
Doctor, 6, 10, 12, 18, 46, 226; before arrival of, 90; remember to call, 102; U. S. Army, 181
Driving, safe, 71, 88
Drowning, 69
Drugs, habit of, 167–168
Dysentery, 111

E

Ear, 282–287
Eating habits, 320–323
Energy, used up, 51
Epidemic, 120, 181, 195; prevention of, 210–211
Equipment, for Byrd expedition, 4
Ether, 18, 103
Eustachian tube, 285
Examination, of eyes, 11; of hearing, 11; physical, 5, 10, 12, 79; of teeth, 6, 10, 12
Exercise, develops muscles, 33; regime of, 32, 35–36; strenuous, 5, 37
Experimentation, value of Antarctica for, 8
Eyesight, 293–300

F

Fainting, 97
Fatigue, and accidents, 67–68
Fats, 46, 50–51
Feet, 11
Fever, 111
Filter beds, 206–208
Firearms, 69, 76
Fires, avoiding, 76
First Aid, to bruises, sprains, and fractures, 91–92; for burns, 94; for cuts and scratches, 92; for frostbite, 95; for poison, 99, 101; for snake-bites, 101; for sunburn, 95; for unconsiousness, 95
Flour, 8
Fly, carrier of germs, 231
Food, canned, 157; essential, 3, 48–51, 54; experts, 57; fresh, 3, 23; inspection of, 57; preparation of, 56; preserved, 6–8; proper, 37; protection of, 56; shortage of, 45; variety of, 54
Fish, 8
Fractures, X ray of leg, 91
Frontier Nursing Service, 135
Frostbite, 22, 95
Fruit, 8

G

Garbage disposal, 164–167, 183, 187, 205

Gas poison, how to avoid, 78
Gastric juice, 322–323
Germs, 162, 210, 220, 227, 231, 253; immunization against, 24, 182, 199, 208–210, 225, 232; scarcity of, 8; soap as preventitive of, 128, 161, 228
Gland, thyroid, 11, 47
Goiter, 47
Gorgas, William C., 174; life of, 178–181, 196–198; and malaria, 193; and pneumonia, 194–195; and yellow fever, 183–190
Government inspection, of foods, 56–58, 201; of milk, 162; of water, 203
Gymasiums, how to avoid accidents in, 78

H

Habana, 184–185, 202
Habits, of cleanliness, 130; of drink, 172; of drugs, 167; good, 62
Harriman, Edward, 256
Harvey, William, 303–309; chart used by, 307
Health, of baby, 161; of community, 140; department of, 135; examination, 11, 12; improvement of, 128; of laborers, 123; mental, 9, 64; physical, 9; protection of, 52; public, 116
Hearing, 64, 282–287; examination for, 11
Heart, 11, 32; and circulatory system, 303–309; weak, 5, 6
Heat exhaustion, 95
Height, correct weight for, 11, 12; relation to age and type (chart), 335–338; and weight card, 12–14
Heise, Dr. H. A., 65
Hippocrates, 210
Hobbies, 39
Holmes, Dr. Oliver Wendell, 104
Hospital, 187; bills, 171; in Crimean War (picture), 112; management of, 116; training schools in, 134; U. S. military (picture), 113; wards in (pictures), 114, 115
Housing conditions, 147, 163–166
Hull House, cooking classes in, 157; garden club of, 160; Jane Addams establishes, 145–147; labor museum in, 157; nursery in, 148–151
Hunter, John, 310–314
Hydrophobia, 208
Hygiene, 58, 209, 230

I

Ice, 7; land of, 15, 16, 17
Immunization, against diseases, 5, 12, 24, 182, 199, 208–210, 225
Infantile paralysis, 37
Infection, foci of, 6; from scratches, 94
Injuries, common, 90; by falls, 76; severe, 95
Inoculation, 136, 199, 209, 281
International Health Board, 172, 196
Iodine, 47

J

Jacob Ruppert, 5, 6

K

Keller, Helen, 271–282, 287–293
Koch, Robert, 236, 259–260

L

Labor Museum, 157–160
Lamp, Lady with the, 106–114
Larynx, 246, 248
Laxatives, 126
Leewenhoek, Anton van, 235–236
Ligaments, 91
Lighting, correct, 38; in surburban home (picture), 125
Lincoln, Abraham, 82
Lindbergh, Charles, 61–65, 68
Lister, Sir Joseph, 236
Little America, 6, 7, 8, 10, 17, 18, 19
Long, Dr. Crawford W., 103
Lunch, 45, 148; at Hull House, 151
Lungs, 11, 305–308

M

Macintosh, 2
Maggots, 216–217
Malaria, 175, 192–194

Meals, 45; planning of, 50, 53, 157; timetable of, 321
Meat, 56; canned, 8; fresh, 23, 47; packing industry, 57
Medical aid, necessity for, 9
Medicine, 124
Mental fitness, 9, 64
Microorganisms, 218–228
Microscope, 234–237, 324–325
Milk, 53; bacteria in, 221; condensed, 8; evaporated, 8; fresh, 56; pasteurization of, 236; rich in calcium, 47; tested, 58, 162, 163
Mineral elements, 46, 48, 51
Morton, Dr. William T. G., 103
Mosquito, 183, 229; in Habana, 184–185; life cycle of, 193; in Panama, 186–195
Motor vehicle accidents, 65–68
Muscles, 32–33, 37, 38, 64, 91

N

Nasal cavity, 243–245
National Safety Council, 72
Navy yards, 82
Nerves, 32
Nervous system, 11
Nightingale, Florence, 106–128; *Notes on Nursing*, 117–128; pictures of, 106, 109
Nose, 11, 243–245, 285
Nurses, 12, 108; in Crimean War, 110–114; training school for, 117; visiting, 134–136
Nutrition, 37; in food, 157

O

Operation, 18–19; anesthesia during, 102
Outdoor activity, 35, 252
Oxygen, 35, 47, 103, 240–243

P

Panama, 174, 178, 186–191, 197
Pasteur, 219–220, 236–237
Pemmican, 49
Penguin, 3
Personality, healthy, 39
Pharynx, 245–246, 248
Physical condition, examination for, 5, 10, 79; good, 29; lives dependent on, 4
Physical defects, 12, 38
Physical efficiency, 32, 37, 43, 64
Physical labor, 44, 51
Physician, 12, 124; for Byrd's men, 6, 18; family, 10
Pimple, 234
Plants, 101, 221–222, 324–325
Playground, 157
Pneumonia, 194–195, 249
Poison, treatment for (table), 100
Posture, 11, 35, 37
Poverty, 141–143, 145, 153–157, 166
Proteins, 46, 51
Protoza, 220
Public health, 116; campaign, 175, 212; nursing, 135
Pure Food Acts, 57

Q

Quarantine, 282
Queen Victoria, 116

R

Railroad, accidents, how to avoid, 77
Ration, for polar climate, 45, 50
Recreation, 25; in books, 4, 24; movies, 4, 24; outdoor, 24
Reed, Dr. Walter, 184
Regular hours, 24
Respiration, 32, 98, 242–248, 262
Rest, 25
Rheumatism, 6
Rockefeller Foundation, 172
Rockefeller Institute, 8

S

Safe driving, 71
Safety, from accidents, 69–71; and alcoholic drinks, 65; for Byrd expedition, 4, 15, 16, 17, 25; for Lindbergh, 62; rules, 64, 79
Salts, 47
Schick test, 199
Schleiden, Professor, 323–325
School children, and accidents, 70–75
Schwann, Professor, 323–325
Scott, 2
Scurvy, 3, 44
Self-medication, 124
Sewage, disposal of, 205–208
Shackleton, 2, 3
Siple, Paul, 4, 5

Skin, 11, 129; care of, 133, 231–234
Slums, room in (picture), 124
Smell, 289
Smoking, 248–249
Snake, 215–216; bite, 101
Sneezing, 229
Snow blindness, 4
Soap, as germicide, 128; good for skin, 133, 232–233
South Pole, 2
Spallanzani, 218
Spectacles, 297–300
Sports, 32, 36
Sprains, 91
Starr, Ellen Gates, 146
Stomach, 317–323
Sunburn, 95
Sunshine, 23, 56, 122
Sunstroke, 94
Supper, 45
Sweatshops, 151–154, 157
Swimming, 37, 75, 180; pool, 131

T

Table manners, 150–151
Teeth, abscessed, 6; care of, 316, 327–330; and diet, 315; diagram of, 315; enamel of, 313; examination of, 10, 12; hardness of, 47; John Hunter studies, 310, 314
Tenements, 147, 163–164, 169
Thorax, 247
Tissue, 323–326
Throat, 11
Toilet preparations, 133
Toilets, 206, 233
Tonsils and adenoids, 245–246; diseased, 6, 285
Touch, sense of, 290
Tourniquet, how to make a, 93
Trachoma, 136
Traffic, accidents, avoidance of, 63, 73–75; deaths in, 71; safety of, 66
Trudeau, Edward, 251–261
Tuberculosis, 5, 37, 175, 211, 250, 251–259; National Association for Prevention of, 260–266
Typhoid fever, 5, 12, 164, 167, 196, 200–203, 207, 212

V

Vegetables, dehydrated, 4, 23, 49; leafy, 47, 52, 56
Veins, 304–308
Ventilation, 23, 25, 118, 121; to prevent drafts, 119
Vision, 64; examined for, 11
Visiting Nurse Associations, 134
Vitamins, 46, 48, 51, 53, 55, 122, 133; C, 44, 315; D, 315, 328
Vomiting, 100

W

Warren, Dr. J. Collins, 104
Water, 46, 49; pollution of, 120–121; pressure of, 241; purity of, 119–120; supply of, 203–205; testing of, 204
Weather, observations of, 19, 26
Weight, card, 13; correct, 11, 12; gaining of, 53
Wells, Dr. Horace, 103
Wood, General Leonard, 183
Work-relief fund, 73
Worry, 66

Y

Yellow fever, 174, 232; cause of, 182–184, 193; and Gorgas, 184–190, 198

HV1624 Fowlkes, John Guy, c.2
K282 L. Jackson & A. Jackson.
F829 SUCCESS THROUGH HEALTH.
(1940)

Date Due

AMERICAN FOUNDATION FOR THE BLIND
15 WEST 16th STREET
NEW YORK, N.Y. 10011

BRO DART Printed in U.S.A.

HERCULES

PATENTED SEPT. 22, 1925

4-46